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The Swope Plan—

Automobile Leaders Balk at Idea of Governmental Control

by Norman G. Shidle

What do automotive executives think of the Swope plan for stabilizing industry and employment?

Some think it's a fine plan filled with possibilities for sound development.

Others think it fine, but impractical.

A few are definitely opposed to it.

Here is a sincere attempt to do a quick, accurate reporting job on this important question of the hour.

TRUE to its heritage of accomplishment through individual effort rather than group action, the automotive industry in general gives every indication of seeing little practicality in the cooperative action features of the plan for stabilization of industry and employment recently propounded by Gerard Swope, president of General Electric Co.

Mr. Swope's plan, it will be recalled, would provide for all industrial workers life, disability and unemployment insurance administered by voluntarily formed trade association groups functioning under governmental supervision. Standardized accounting throughout industry also was recommended, this too under a Federal supervisory body cooperating with the Internal Revenue Department and the trade associations. The complete Swope plan was published in *Automotive Industries* of Sept. 26.

It would be going too far to state that the automotive industry is ready to speak with one voice concerning the merits or demerits of Mr. Swope's proposal; it would be going too far, in fact, to say that the industry as a whole was ready to speak at all.

But confidential inquiry among leading executives throughout the automotive field just completed by this publication has developed a surprising unanimity of opinion unfavorable to those features having to do with cooperative inter-industry action which, in a certain sense, were the essence of Mr. Swope's projected plan.

Over and over again, automotive executives were found saying: "We don't want any kind of plan which permits the government to have anything to do with supervising industrial operations. . . . Government must be kept out of business. . . . Each company has to work out its own destiny. . . . Cooperation between all units in an industry is a nice idea, but it just isn't practical. . . ."

Several very important automotive men are reserving comment on the Swope ideas until they have had further chance for study and investigation, but among

the group of representative men typifying both the vehicle and parts ends of the industry, there can be no mistaking the presence of strong skepticism concerning the feasibility of Mr. Swope's basic suggestions.

Concerning specific phases of the Swope plan, however, considerable commendation came from this same group of men. Acceptance of social responsibility by management for the permanent well-being of the employees of industry unquestionably is general. Proposals for more widespread application of group insurance plans, old age pensions and even some types of unemployment insurance meet with rather general acceptance, only a modicum of automotive commentators clinging to the theory of complete individualism and of placing on the individual full and sole responsibility for his own care under any and all circumstances.

Automotive men in general seem to feel that the best and most practical method of providing unemployment insurance is through further stabilization of the production curve. One important president, for example, pointed out the peculiar difficulties in the way of production stabilization by automotive factories, and then added:

"Despite these big difficulties, I firmly believe that we in the automotive industry can go very, very much further than we ever have before toward stabilizing our production curve and thus provide steadier employment than ever before for the men working in our factories. Unquestionably the problem has become acute; but I believe that we can make major improvements along this line now that the gravity of the matter is fully recognized and definite efforts to lick the problem are being made."

This opinion was rather generally echoed by a majority of other important automotive leaders contacted and it was on this phase of unemployment relief that automotive men seemed to lay the greatest emphasis. Actual unemployment insurance involving the setting up in good times of reserve funds from both corporation profits and workers' pay envelopes, to be disbursed in depression times meets with some acceptance, but not with universal approval by any means. The chief executive of one of the outstanding parts companies has this to say:

Unemployment Insurance at This Time

"Unemployment insurance to be participated in by employer and employees is scarcely feasible at this time, but should be arranged in time of reasonable prosperity. It is my hope that when normal conditions are restored and our employees have a reasonable amount of income to work out a plan for unemployment insurance, desirable phases in Mr. Swope's plan may be achieved. This has been my aim for some time but conditions have been against it."

An opposite stand is taken by the head of another big parts organization, however, who believes that:

"If in times of reasonable prosperity and high wages employees elect to take out insurance against the evil days of unemployment and pay for the insurance themselves, it would doubtless help some, but any arrangement by which the employers of labor undertake by mutual agreement or are in any way compelled to insure their employees at the expense of the institutions which employ them would completely put out of business a large number of employers that might stem the tide of depression by the aid and cooperation of their employees."

This same idea is involved in the comments of the president of another company, long prominent as a manufacturer of an important automobile unit part. He says, among other things:

"The workman, it seems to me, has many of the same problems confronting the company. His wages, like the company's sales, are governed by the law of supply and demand and regulated accordingly. If he is thrifty, lives within his means and plans for the bad times which inevitably come, he can survive, pay his taxes and meet his living expenses until conditions improve. Failure is inevitable for the worker or for the company which does not properly recognize and apply these fundamental rules."

Voluntary Versus Forced Action

One executive interviewed brought up what would appear to be an important point which seems not to have received generally specific consideration; namely, that, if industry does not itself seek and actually find means of stabilization—even at the expense of permitting or asking for some general type of supervising or coordinating agency—then it may, in the long run, find itself saddled with legislation thrust upon it by politicians, limiting and detrimental in its industrial effects and sadly lacking in economic understanding.

"Better to put certain reasonable limitations on ourselves voluntarily through cooperative action," this executive said, "than to wait for political legislative action to impose on us uneconomc and unworkable legislation."

The most interesting public exposition of this point of view by an industrial executive to come to light recently—aside from Mr. Swope's own widely discussed ideas—is that of James W. Hook, president, Geometric Tool Co., a member of the President's Emergency Committee for Unemployment, and chairman of the Connecticut Unemployment Commission. In a talk made last August, Mr. Hook, referring to unemployment insurance, said in part:

"Whether the reserve funds shall be created jointly by industry and those employed by industry, is a question for individual units of industry to decide. There are arguments on both sides. . . . It will be said that there is not a beggar's chance of industry doing this voluntarily. That may be true, but let us hope not. If it is true, then this country is headed directly for some sort of so-called compulsory public unemployment insurance that will force upon industry a disproportionate amount of the load."

Then, taking a stand against the type of unemployment insurance which England has developed, he continued:

"Let us have none of that. Let industry solve its own problem, if necessary, under regulatory laws that will make all units of industry accept the principle uniformly. But let industry do the job.

"Do I see ears prick up and heads shake at the suggestion of regulatory laws? No one can be blamed if they do. We have good reason to quaver at the thought of added laws. But if unemployment insurance comes, we shall have many more laws and regulations, and industry will have precious little to say as to what they shall be. If the principle of setting aside reserves during prosperous years to assist stable employees over depressed business periods is accepted by industry, perhaps it would be good to have their amount regulated by law (much as tax liabilities now are) so that all competitive units of industry would be on precisely the same basis. Nothing would do

(Turn to page 739, please)

Comparison Chart of Eight "Economic Stabilization Plans"

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PLAN	Effective Power Provided	Government Regulation Provided	Anti-Trust Law Amendment	Unemployment Plan	Other Provisions
SWOPE PLAN	Trade Association; Membership in which is compulsory after 3 years for companies with 50 or more employees. Rulings mandatory.	Continuous Regulation by Federal Trade Commission or other body.	Amendment Probably Necessary.	Elaborate provision for life and disability insurance, pensions and unemployment insurance; benefits to follow employee when he changes job.	Standardized forms for quarterly financial reports to stockholders. Plans to stabilize price and equalize production with consumption.
U. S. CHAMBER OF COMMERCE PLAN	National Economic Council; power not mandatory, but only suggestive.	No Regulation.	Limited Amendment Urged as Desirable.	Local aid urged, and individual corporation plans; with definite reserves. Public works planning.	Steps to disarmament. Curb on manipulative speculation.
AMERICAN FEDERATION OF LABOR PLAN	National Economic Council; power not mandatory, but suggestive. Development of more scientific plan of production.	No Regulation.	Amendment Strongly Urged.	Calling of National Conference to spread jobs; maintenance of wages; guarantees of jobs; long-range stabilization plans.	Five-day week and shorter day immediately; prohibition of child labor; gigantic program public building; stronger employment agencies.
"FORUM" PLAN (JAY FRANKLIN)	"U. S. Incorporated;" 5 per cent of corporation and partnership control stock of all business to be turned over to government, for 5 years. Key industries to be grouped into regional or national monopolies. Dividends to citizens later issued in form of consumption goods at cost.	Regulation through "Treasury Bureau of Corporations;" also "Federal Forecasting" Bureau; and "Federal Trade Board."	Amendment or Annulment.	Organization of "State Labor Militia" and "Standing Labor Army" of Unemployed; Production quotas and wages fixed by regulatory bodies.	Revision of Income Tax; heavier in higher brackets; development of great national waterways. International gold conference, and special session Congress for revision of Federal Reserve and anti-trust laws to compel membership in Reserve of all interstate banks, guarantee deposits, enlarge bank examination, include in discounts eligible certain classes corporation securities.
STUART CHASE'S PLAN	"Peace Industries Board;" revival of War Industries Board for Ten-Year Plan; seven members; using coercive, mandatory power; confined to 20 or 30 basic, necessary industries. Functional divisions: Planning and statistics, investment and banking, conservation and waste, labor relations, distribution, legal, public health and sanitation, publicity, industrial psychology.	Continuous Regulation and Review.	Amendment Permitting Combination.	National employment bureaus, reduction of hours, unemployment insurance, gradual raising of wages; allocation of labor.	Suggested absorption of Federal Trade Commission, Interstate Commerce Commission, Federal Reserve Board, Federal Power Commission, etc.
MATHEW WOLL-JAMES W. GERARD PLAN FOR NATIONAL CIVIC FEDERATION	"Business Congress" of all existing industrial organizations, in continuous session. No limitations or restrictions; full and complete power, even to fix prices or combine. Ten-Year Plan.	Continuous Regulation and Review.	Amendment Required.	Unemployment insurance plans set up under cooperation of labor and industry.	Raising of average industrial wage.
PROF. CHARLES A. BEARD'S PLAN	"National Economic Council," authorized by Congress, to coordinate the highly concentrated industries in finance, operation, distribution, on the basis that business is public service enterprise. "Board of Strategy and Planning" also to be used. (Technical Staff.) Each industry governed by subsidiary syndicates (each with its own planning board) including an Agricultural Syndicate, a Marketing Syndicate for retail-wholesale government, an Export Syndicate, and a Building Materials and Housing Syndicate (which will float "Freedom Bonds" for huge housing programs).	Continuous Regulation.	Amendment as Required.	Use of Unemployed on housing and public project programs.	President to call special session Congress to organize Agricultural and Housing Syndicates at once.
ASSOCIATED GENERAL CONTRACTORS OF AMERICA PLAN	Grant by Congress of greater power to Federal Reserve Board (special session to be called immediately). Bond issues to be authorized for Revolving Fund to buy special tax bills against specific construction and improvements; bond issues also for increasing public and semi-public construction. Federal Reserve to guarantee solvency of banks and force hoarded capital to circulate. Public debt retirement to be deferred.	Greater degree of financial regulation; licensing of contractors; establishment construction credit bureaus.	No Amendment Required.	Stimulation of employment through greater building and construction activity.	Issuance of state bonds for public buildings; development of home loan banks; propaganda to educate public that increased public services mean increased taxes.

Twelve of Fifteen New Models at Olympia Show Have Small Engines

THE Olympia passenger car show indicates that the general trend of British demand is toward still smaller engine size. There are only two new models of 20 hp. (150 and 180 cu. in. respectively), one of 18 hp. (150 cu. in.) and only one of 14 hp. (130 cu. in.). These four are six-cylinder models. The others consist of a 7-hp., two-cylinder, rear-engined Rover, an 8-hp., four-cylinder Morris (a slightly enlarged version of the continued Minor), three 9-hp. and two 10-hp. fours, and four 12-hp. sixes. Twelve of fifteen new models are therefore of 14 hp. or smaller, and there is not one with more than six cylinders.

The small four-passenger car unquestionably attracts by far the largest interest at Olympia, and this is quite in accord with recent registration figures, which show that 66 per cent of British car sales are models of 14 hp. or less, while only 24 per cent relate to cars of over 16 hp.

Three of the new models represent what may be termed a new type of car. It has a four-cylinder engine of between 60 and 70 cu. in., a wheelbase of about 90 in., and a track ranging from 42 to 48 in. It is therefore somewhat larger than the midget cars, such as the Austin Seven, Morris Minor, etc., and is designed expressly for four-passenger bodies, with equal room and comfort for front and rear occupants. In price it is usually not much more than the four-seated "midgets." The examples of this type and some of their leading features are as follows:

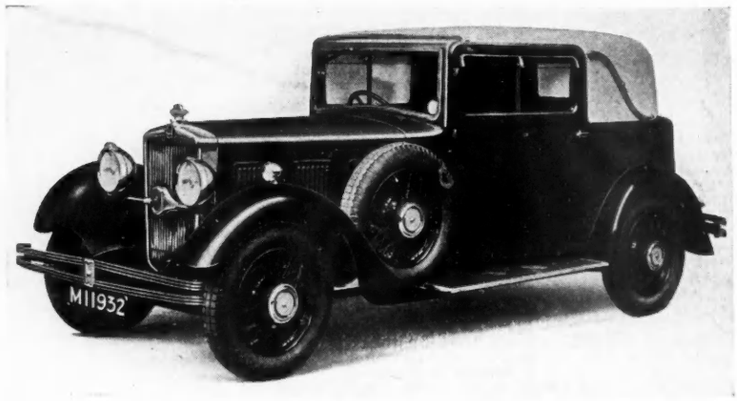
Name	Piston Displacement	No. of Gears	Wheelbase	Track	Sedan Price
Standard	60 cu. in.	3	90 in.	42 in.	£155*
Triumph	60 cu. in.	4	87 in.	43 in.	£175†
Hillman	70 cu. in.	3	92 in.	48 in.	£155†

* With sliding roof.
† Sliding roof extra.

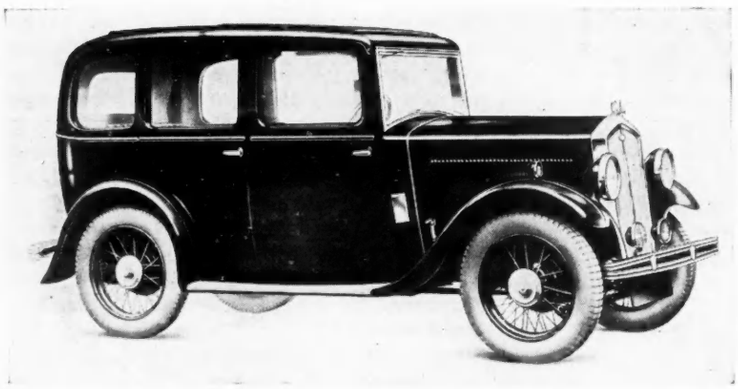
There is no question as to there being a big market for this new type. Standard put forward the first example (at the end of July) and has been overwhelmed with orders. This "Little Nine" is an almost exact replica of the same maker's "Big Nine," which, with its 78-cu. in., four-cylinder engine, 100-in. wheelbase and 48-in. track, has been one of the most popular cars of 1931 and is no less in demand now.

Among other new models of popular appeal are two small sixes by Rover and Singer. The Rover has an overhead valve engine of 85 cu. in., four speeds, with helical third, a wheelbase of 104 in., and a 50-in. track; the four-door six light sedan, with sliding roof, leather upholstery, folding central armrest at rear, wire wheels, 4.75-in. tires and 5.2-to-1 worm drive, is £225. The Singer has a side-valve engine of 90 cu. in., four speeds, 108-in. wheelbase, 52-in. track, sliding roof, leather upholstery, Triplex screen, wire wheels, 4.4-in. tires, and 5.4-to-1 spiral bevel drive, the four-door sedan being £235.

These two cars are already making a more forcible

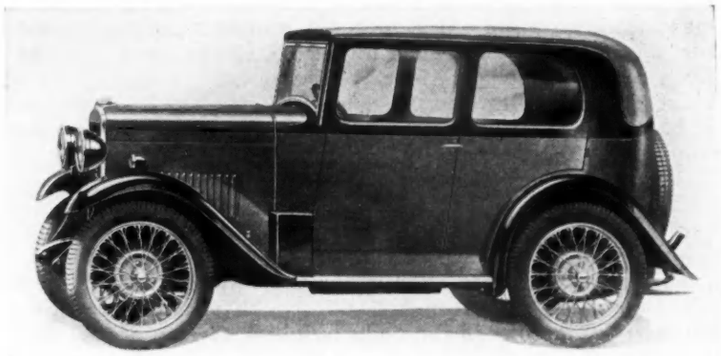


Above—Morris sports sedan with "Eddyfree" roof. Each of the wide doors has dual windows + +

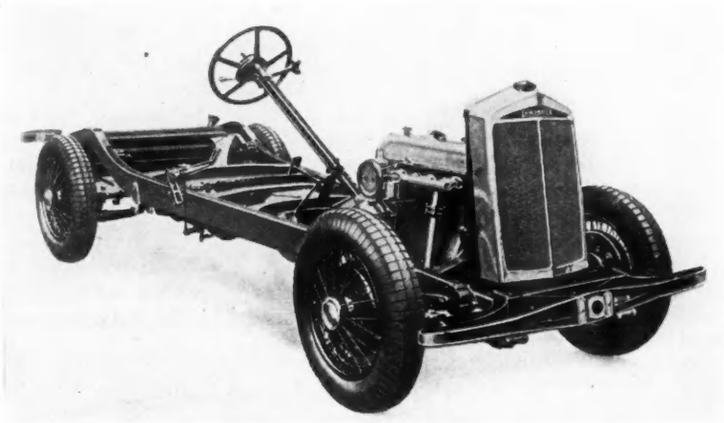


Left — The revised six-cylinder Wolseley Hornet, which has the radiator and engine moved forward for increased body space

by
M. W.
Bourdon



Above—"Pillarless" sedan on 7 hp. Triumph. Front door closes on to rear one, latter being secured by coupled top and bottom "bolts"



Left—New 15-18 hp. Lanchester chassis, with Daimler fluid flywheel and self-changing gearset. Note the forward position of the sloping radiator + + + + +

appeal than the light sixes introduced during the past year or two with engines of about 120 cu. in. capacity; they follow the lead given by Austin early this year in introducing his Twelve-Six, which, with its 90-cu. in. engine, 106-in. wheelbase and 50-in. track, represents approximately the largest type of British car for which there is a really big demand.

It may be recalled that Morris last year introduced the four-passenger Major Six, which, to all intents, was the Cowley Four chassis with the five-passenger Oxford Six engine (118 cu. in.). Now the Major has an engine of its own with a piston displacement of 110 cu. in., the bore being smaller to give it a lower tax rating. This is evidence of a peculiar fact as regards current British demand, viz., that a great many buyers, where two or more cars with equal seating capacity are in question, will give preference to the one with the smaller engine, for the saving on tax, insurance and operating costs. With one model in each case, Hillman and Morris give the buyer a choice of engine sizes without price increase, and Standard in the Twenty chassis now offers the Sixteen engine as an option.

It is not surprising, therefore, that the trend of British design is to offer the biggest possible seating accommodation with the smallest possible engine, within reason. Hence it is that Invicta, hitherto specializing in cars of 275 cu. in., rated at 30 hp., has produced a new model with a 90-cu. in. (12-hp.), engine in a chassis intended for full-sized, five-passenger bodies, the wheelbase being 118 in. and the track 56 in.; this is a relatively expensive model alongside the majority of small sixes, the cheapest sedan being £400. Lanchester, too, has taken cognizance of the "economy wave," and has a new six, 15-18 hp. (150 cu. in.) which is offered at £565 with a four-passenger sedan. Star is another maker catering for a more popular demand than hitherto, having a new six of 14 hp. (130 cu. in.) at £345 for the four-passenger sedan, this price including a four-wheel hydraulic jacking equipment, as on the larger types.

Another feature of the British demand indicated at Olympia is that a large proportion of buyers of cars, ranging in price from £180 to £250, actually prefer a four-cylinder engine. As already intimated, Standard continues to find an increasing demand for the "Big Nine" (78 cu. in.) with its four-cylinder engine selling in 1931 at £225 with three speeds and a metal sedan (the price is now £205 with four speeds), despite Austin offering the Twelve-Six (90 cu. in.) with similar bodywork and specification at £198. The Morris model still in biggest demand is the Cowley Four (94 cu. in.) at £180 for the three-speed sedan, despite the Morris Major Six being offered at £200 with four speeds. As another example of the preference for four cylinders the case of Austin may be cited; the Twelve-Six was expected last spring to supersede the Twelve-Four, especially as the latter was priced approximately £100 more than the other; but no, the Four is continued for 1932 for the reason that the demand for it persists, even at the higher price. It is not surprising in view of the foregoing that no British maker has introduced a new model with more than six cylinders.

With few exceptions British car prices are reduced for 1932, in some cases very considerably. Triumph, for example, has models that are from 20 to 25 per cent lower in price than last year; all

Morris prices are down; Standard prices are reduced by 15 per cent; Austin includes additional equipment that has been extra hitherto, and this represents price reductions ranging up to 10 per cent. Even Rolls Royce chassis prices, after being stabilized for several years past, are reduced by £100 and £135 respectively for the 40-50 hp. and 20-25 hp. models.

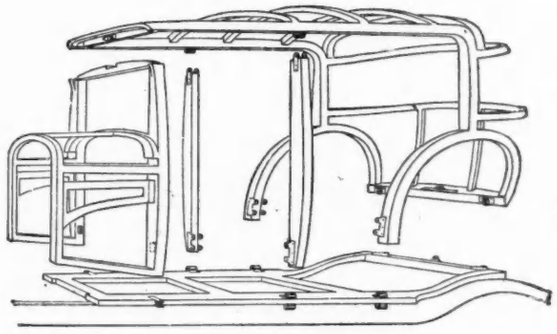
The fabric body, which secured such widespread popularity two or three years ago, is conspicuous by its rarity at Olympia this year among motor manufacturers' standard products. The majority of makers have ceased to offer it, owing to its having fallen so much out of favor, and though examples are fairly numerous in the body builders' section of the show, the proportion is far smaller than in late years.

On the other hand, the all-steel body has made inappreciable progress. Austin uses it on the Twelve-Six and has added an all-steel sedan at a lower price to the range of composite bodies for the Sixteen-Six. But Morris, who had had all-steel bodies in the recent past, has now gone back to the composite type. Morris, incidentally, is no longer financially interested in the Pressed Steel Co. of Great Britain, organized by the Budd Corp., which has a plant next to Morris at Cowley; in consequence, the Pressed Steel Co. is now supplying many British car makers besides Morris with bodies, most of them of the composite type.

Although the type of body in biggest demand in England is the four-door six-light sedan—the two-door and four-light design having lost favor—there is evidence at Olympia of a renewal of the demand for what is termed the sports coupé, which, in effect, is a close-coupled sedan with an integral luggage container at the rear and with rear seating that is intended more for occasional than regular use. This type is shown by a large proportion of body-builders and has reappeared in a few motor manufacturers' lists. But it now usually has four doors. As in the case of sedans, it is almost invariably fitted with a sliding roof, a feature that latterly has been demanded by approximately 80 per cent of British buyers.

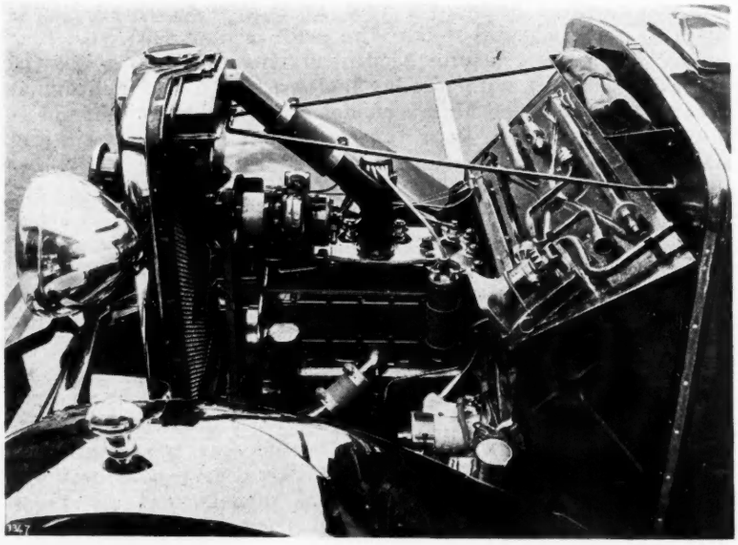
Morris has adopted for all chassis models a sedan body design known as the "Eddyfree." Its special feature is a roof that curves abruptly upward and rearward from above the windshield instead of having the usual peak or visor extension; it is reminiscent of the Chrysler "Imperial" limousine. Singer introduced this scheme last spring on a special body known as the Kaye Don model for the largest six-cylinder chassis, the radiator top being correspondingly curved, with a filler under the hood; this Singer design is now shown also on a somewhat enlarged "Junior" (8 hp.) chassis, while Wolseley (a Morris subsidiary) has the "Eddyfree" roof on a new version of the 12-hp. Hornet Six, and the same idea is applied in some of the Rover sedans and in several custom-built bodies.

A trend of body design for higher-priced cars is exemplified on a new "sports saloon" for the Armstrong-Siddeley Fifteen and Twenty. The rear panel, instead of curving "inward" from the waistline, sweeps "outward" (i.e. towards the rear) and extends beyond the gasoline tank, completely hiding the latter. The integral side and rear panels are also extended laterally over the rear fenders and fill up the space that ordinarily exists between the body and the lower part of the fenders. This scheme allows a small luggage locker to be provided behind the rear seat, over the tank, the door of the locker being hinged at the bottom edge to fall back and serve as a luggage grid supplementing the space within the locker.



Right—"Silent Travel" system of body construction. The two main units, rigid in themselves, are flexibly coupled together and to the foundation timbers which are bolted to the chassis + + + +

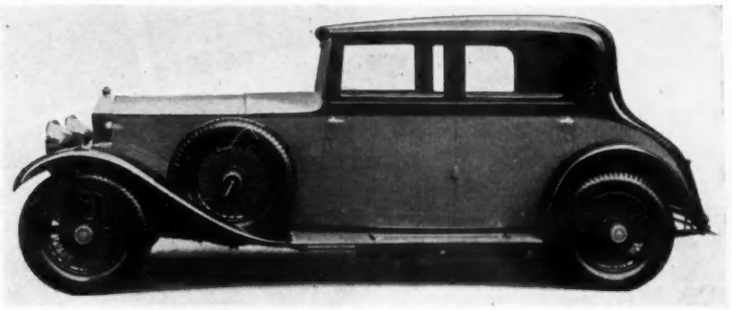
Below—Engine of new 10 hp. (70 cu. in.) Hillman. Note disposition of tool equipment above extension of front floor space



On an ordinary sedan body Armstrong Siddeley has obviated the "untidy" appearance of the usual luggage grid. The rear of the car has a smooth-surfaced, curved apron hiding the gasoline tank, but this apron is hinged and can be swung back into a horizontal position, then forming a luggage platform with a slatted upper surface.

Triumph has introduced a "pillarless" sedan for the 7 hp. (81-in. wheelbase) chassis, there are no pillars between

Right — Five-passenger sedan on 20-25 hp. Rolls-Royce chassis. Rear end typifies practice of extending rear paneling to inclose fuel tank



Below—Signaling window on Vauxhall sedan. The hinged section closes as the hand is withdrawn, enabling the two sections as a unit to be raised or lowered + +

the doors, the front door closing and latching on to the rear one, and the latter being secured by vertical top and bottom bolts. This body gives wide entrances to the miniature sedan body. The same idea was exhibited at Olympia two years ago by a bodybuilder.

Lanchaster and Wolseley, departing from orthodox practice, have shifted the radiator forward, 10 or 12 in. in front of the front axle and, by moving the engine correspondingly farther forward in the frame, have gained that much in body length without increasing the wheelbase. On the 115-in. wheelbase Lanchester (the new 15-18 hp. Six) the body is as long as that of the average car of 126-in. wheelbase, while on the Wolseley "Hornet" Six (90-wheelbase) a four-door in place of a two-door sedan is fitted. The "down-at-the-front" or "falling-forward" effect, which might be expected to result from the radiator being so far forward, is obviated by giving the radiator a pronounced rearward slope, and the appearance of these two cars, though unorthodox, is by no means unattractive.

A new system of construction for composite bodies, known as "Silent Travel," appears at Olympia; it is not used yet by any British motor manufacturer, but by several builders of custom bodies. A French conception, it consists of a wood framing in two sections, front and rear, that are rigid in themselves but are flexibly coupled to each other and to foundation timbers bolted rigidly to the chassis. The flexible couplings may be likened to hinges with rubber (silent bloc) bushings for the hinge pins. The central door pillars are similarly secured at top and bottom.

There are more sedans and coupés with the windshield having a pronounced slope, and this now is often accompanied by a corresponding forward inclination of the rear panel above the waistline.

Another trend in British practice is toward more or less eliminating the cowl and extending the length of the hood correspondingly. Some cowls extend forward only 4 or 6 in. from the base of the windshield. At present only Riley and M. G., on one model each, have a hood filling up the whole length between radiator and windshield; but that practice may well be extended in the near future. Its application to large cars is exemplified at Olympia on a 45-hp. straight-eight Isotta Fraschini.

Morris (except on the Minor range) has added a close-coupled, two-door sedan with integral rear luggage locker, termed a "sports coupé." It is a two-door type and embodies a feature observed at Olympia on several cars with unusually wide doors, viz., two separate glasses, each raised or lowered independently, with a narrow grooved metal strip between them.

Phaetons and roadsters are considerably more numerous at Olympia this year, and it is believed that the prevalence of convertible sedans and the sliding roof have resurrected some of the appreciation of "open-air motoring."

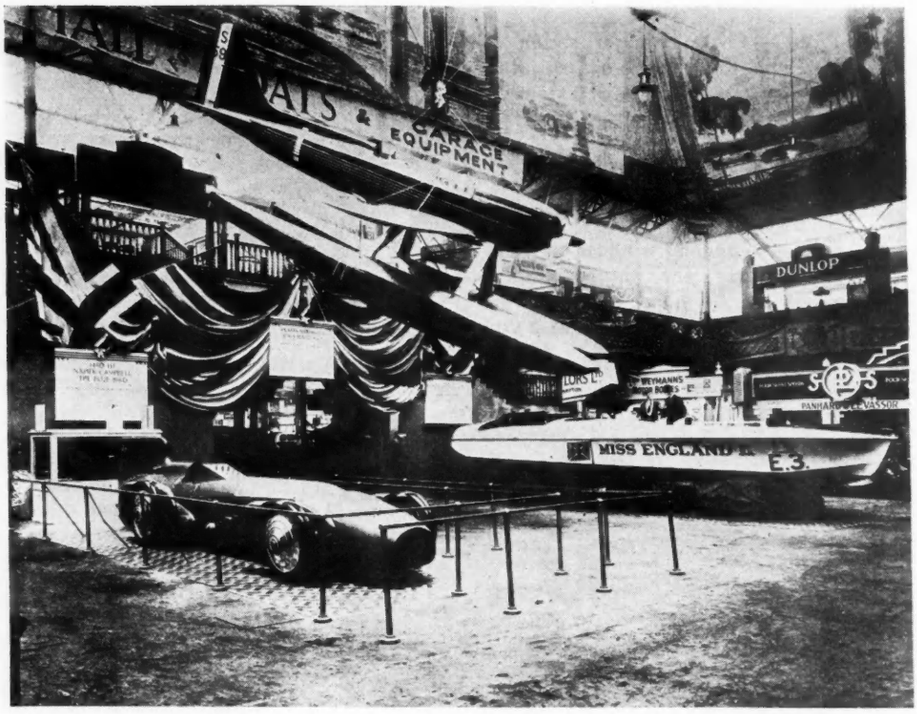
A comparison at Olympia of British, American and European bodywork in general immediately conveys the impression that British designers are not so generous in the provision of moldings, stripes and lining. There is less "ornamentation" by these and other means, an attractive appearance being gained by simplicity of finish and symmetry of outline. Bright colors are used, but two-color schemes in standard jobs are exceptional.

Turning now to engineering developments, it can be said at once that there is no evidence of any coming wide departure from orthodox practice. Independent springing and a rear engine are found on only one British make at the show—a new Rover, termed the "Scarab." It has a 7-hp. air-cooled Vee twin engine at the rear, a three-speed drive to the rear axle and independent suspension by coil springs. At present it is offered only with a small four-passenger open body on a wheelbase of 78 in. and a 42-in. track, the price being £89.

The rear-engined Trojan appears again; it is the only British car with a free wheel, a feature that has been added lately, not for use in gear-shifting (for the car has planetary gears) but to obviate vibration on the over-run.

Not only the free wheel has failed to appeal to British manufacturers; that other American feature, the synchro-mesh transmission, also is without counterpart on British cars, apart from the three-speed Vauxhall "Cadet," the light Six introduced last year.

There is a considerable increase in the number



This interesting collection of speed champions at the Olympia show includes Sir Malcolm Campbell's "Bluebird," holder of the world's land speed record; Sir Charles Wakefield's "Miss England II," in which Kaye Don broke the world's water speed record, and the Vickers super-marine seaplane, in which Flight Lieutenant Stainforth broke the world's air speed record. All three prize winners are being shown at the motor show at Olympia

International Newsreel Photo

of British cars with four speeds; in most cases the third has helical gears, single or "herringbone." Vauxhall on the larger Six and Standard on the new "Little Nine" are the only examples of a three-speed transmission with helical second.

The only other transmission development of note is the provision by Armstrong Siddeley of the Wilson self-changing gearset on all instead of only some models, and the use on the new Lanchester of this gearset in conjunction with the Daimler fluid flywheel, which Armstrong Siddeley offers as an extra with the 20-hp. and 30hp. models. Lanchester is now a Daimler subsidiary; hence the use of the fluid flywheel and self-changing gearset, now standard for the first time on all Daimler cars instead of being an extra in some cases. Lagonda has a new three-liter Six with the Maybach preselective transmission providing eight speeds in all, viz., four normal and four low, with vacuum-servo operation;

There are no developments in regard to final drive, or spring suspension. Wire wheels have practically superseded the hollow-spoked pressed steel variety. The wire wheels now most widely used are the Dunlop Magna type, which have large hubs that inclose the wheel-fixing studs and nuts.

Cam steering gears are most widely used, but several new models, nevertheless, have one of the alternatives, viz., worm and worm wheel or screw and nut. "Self-straightening" steering equipments are almost universal.

Morris on several continued models and Riley on the two sizes—a Four and a Six—that constitute the full range have adopted the "double-dropped" frame. M. G., a Morris subsidiary specializing in "sporting" and semi-racing cars, has a new small Six (76 cu. in.) with its frame suspended below the axles from half-elliptic springs, bringing the frame level.

"Footwells" for the rear passengers are extensively used on many models up to 20 hp. with close-coupled sedan bodywork. On small cars these footwells are deeper and extend farther forward—halfway under the front seats in one or two instances. There is a very pronounced trend toward providing increased rear seat width by more extensively "paddle-boxing" the rear wheels, the wheel arches inside the body serving as the foundations for upholstered armrests. The folding central armrest is found on many more cars of moderate price and small size.

As regards engine design, overhead and side valves are just about equally divided among new models; 25 per cent of the overhead type have overhead camshafts. A development in this connection is the adoption by Crossley and Triumph in new models of the Whatmough-Hewitt valve arrangement and combustion chamber design; this consists of superimposed valves (overhead inlet and side exhaust) with a combustion chamber reminiscent of the Whatmough type for side valves.

Nearly all new models have battery ignition with semi-automatic control. Pistons are mainly aluminum or aluminum and steel, with isolated examples of magnesium alloys; the tendency toward duralumin connecting rods has not extended appreciably. Among new models only the Star Fourteen Six has separate cylinder liners, which in this respect is in line with continued models of this make.

The downdraft carburetor has been dropped in the case of one Humber Six and continued on the other; Crossley is an additional maker to adopt this type (on the new 10-hp. Four).

Rolls Royce has extended centralized chassis lubrication to the spring plates and front and rear axles of both models. No new model except the Star Fourteen has other than the usual system of oil-gun nipples.

JUST AMONG OURSELVES

Cooperative Advertising

CARL W. ACKERMAN suggests creation of a $25,000,000 cooperative advertising pool to overcome the economic stage fright of the American people. He thinks the automotive industry, for example, has a great chance to use cooperative advertising to coordinate the press and a great industry in a movement to build confidence and restore industrial activity.

Mr. Ackerman's suggestion is worth active consideration as a practical possibility. Not only is he Dean of the Columbia School of Journalism, but just prior to his academic connection was head of the public relations division of General Motors Corp., worked very closely with A. P. Sloan, Jr., himself and, presumably, is thoroughly familiar in a practical way with the immediate operating problems of our industry as well as with the more general economic theory concerning it.

To Revolve Around the Automotive Industry

HE suggests, in a talk made to the Advertising Club of New York, that the rubber, steel and oil industries join the railroads in advocating increased automobile production by subscribing to the $25,000,000 pool in addition to appropriations for individual competitive advertising. His idea is, apparently, that the big cooperative campaign might well revolve around the automotive industry to begin with because our industry is the key manufacturing industry of the country and because its upswing would mean renewed employment for literally millions of men and women throughout all industry.

And should the development of his idea take place, it will be important to remember the important place occupied by individual trade and retail units in influencing public opinion on matters of this kind. The automobile dealer and service man, for example, almost dictates the make and type of products used by a majority of his customers who look to him as the authority on the particular items in which he deals. Confidence and activity generated throughout trade units in itself will mean much to the vigor of merchandising activity, which in turn tend to generate sales and general prosperity through releasing money now frozen in savings accounts and deposit vaults.

A Premium on Length of Service

IN no branch of the automotive industry, probably, is there less continuity of service on the part of individuals than in that of retail selling. Moving about from dealer to dealer has been almost as much a tradition with automobile salesmen as with newspaper reporters in the old days.

Other things being equal, certainly, retail selling would be improved were the same salesmen to work at the same place for longer periods of time. And yet, it would seem, relatively less thought has been given to this phase of improving retail salesmanship than to many others. In fact all phases of salesmen training are definitely hampered by the nomadic instincts of the average salesman.

Perhaps the most logical place to go to work on this problem would be in the compensation plan. While some advantages do accrue to the older salesmen under several plans now in effect, there would seem to be a definite advantage to accrue to a plan of paying salesmen in which the relation between length of employment and income was quite definite and direct. Industrial organizations in some cases have worked out bonus plans, part of the funds for which are created by the company and part by the performance of the employee, which run over a certain period of years. The employee leaving before that period is up loses some of the benefits of the bonus. Perhaps some similar principle might be worked out sometime in connection with retail salesmen. One factory, we believe, is already considering some such plan.

Back to the Horse in Australia

HAVE just learned from *The Australian Motorist* that a vigorous "Back to Horses" movement is being waged in Australia. This "largest monthly motor journal published in the Commonwealth" devotes a full page in its September issue to a detailed discussion of the pros and cons of the proposal.

Relative depreciation of horses and motor vehicles; garages and stables are compared from the angle of sanitation; the effect on the petrol business is discussed; relative horse-motor vehicle operating costs are outlined, and many other factors involved are treated specifically.

Recalls the days of 15 years ago over here when this same argument was a major issue.—N.G.S.

Tip Relief of Gear Teeth Prevents

It reduces the arc of action and therefore must not be carried to excess or rough tooth action will result + + +

A GEAR tooth having a profile which departs from the theoretical in such a manner that the tooth is relieved or eased off, from a point somewhere between the pitch circle and the outside circle, the ease-off increasing continuously from that point to the top, is said to have tip relief. The relief may be in the form of a tangent arc of a circle, an intersecting arc of a circle, a cycloidal curve, another involute curve of a greater pressure angle, or some other curve of indeterminate form.

Should there be interference in gears cut by "range cutters," it is only necessary to sink the cutter deeper to make the gears roll freely, for "range cutters" have a correction introduced to care for the higher numbers of teeth in the range for which they are intended.

In order to obtain smooth-running, quiet, and long-wearing gears, tip relief of some form is generally necessary. Fig. 1, which shows a pair of gear teeth which are just about to enter contact and assume their proportion of the load, illustrates what tip relief does. As the flank of the pinion tooth approaches the tip of the mating gear tooth, tip relief on the gear will delay the engagement until the sharp corner on the gear tooth has passed the theoretical initial point of contact, and any possibility of gouging or scraping, with the resultant vibration, noise, and serious wear, is avoided, should the two involute curves not be exactly tangent to each other at that point.

Even if the involute curves were exactly tangent to each other at the point where contact would nominally first occur, there is a tendency for the sharp corner on the gear tooth to break the film of lubricant momentarily. Tip relief will remedy that condition to the extent of allowing a film of lubricant to be present on each side of the contact point.

A ridge is formed in the flank of the pinion tooth and the tip of the mating gear tooth is rounded off. Tip relief on the gear tooth prevents that rounding at the tip of the tooth, which, when once started, continues at a rapid rate and soon reaches a point where the profiles are no longer conjugate. Once a pair of gears with tip relief have passed through the stage of rapid wear, the relief is automatically continued by the subsequent wear, although to a lesser amount than originally produced. This is believed to be due to the greater wear rate at the tips of the teeth, where the amount of sliding is the maximum.

Paper presented at the Fifteenth Semi-Annual Meeting of the American Gear Manufacturers Association, Pittsburgh, October 15. Condensed.

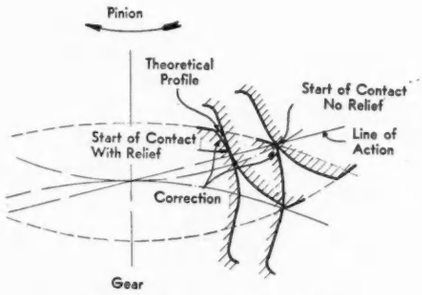


Fig. 1 — Sketch showing flank of pinion tooth coming into contact with tip of gear tooth + +

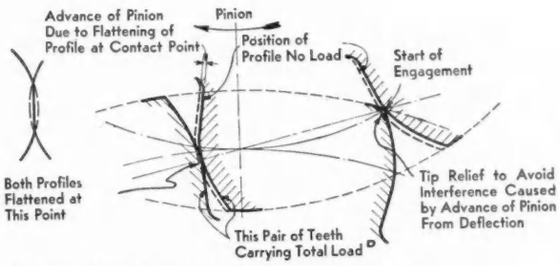

Advance of Pinion Due to Flattening of Profile at Contact Point
Pinion
Position of Profile No Load
Start of Engagement
Both Profiles Flattened at This Point
Tip Relief to Avoid Interference Caused by Advance of Pinion From Deflection
This Pair of Teeth Carrying Total Load

Fig. 2—Showing interference caused by deflection of teeth + + + +

One reason for the greater smoothness of action of gears having tip relief may be the decrease of the arc-of-approach action. The friction of approach action is greater than that of recession, and while tip relief does not increase the arc of recession (as a long and short addendum tooth form does), it decreases the arc of approach.

A certain amount of deformation of the teeth under load results from bending of the teeth and elastic compression of the material at the point of contact. Deformation of the teeth under load is very slight under normal conditions and moderate loads. However, owing to the tendency toward higher speeds and loads, it is necessary to check these deformations to determine if there is a possibility of their causing interference.

Fig. 2 shows a pair of teeth in contact without load. If torque is applied to the pinion, the latter will advance, owing to deflection of the teeth in contact, and

Gouging and Scraping

by T. R. Rideout
Westinghouse Electric & Mfg. Co.
Nuttall Gear Works

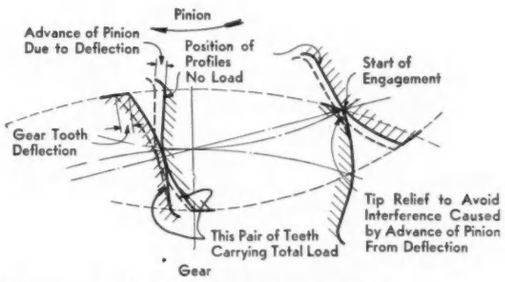

Pinion
Advance of Pinion Due to Deflection
Position of Profiles No Load
Start of Engagement
Gear Tooth Deflection
Tip Relief to Avoid Interference Caused by Advance of Pinion From Deflection
This Pair of Teeth Carrying Total Load
Gear

Fig. 3 — Showing interference caused by compression at point of contact + + + + +

the teeth will assume the positions indicated by the dotted lines. (The pinion tooth will deflect slightly more than the gear tooth, because the beam strength of a pinion tooth is always less than that of the gear tooth, and also because the point of application of the load at the last position of contact, where only one pair of teeth is carrying the entire load, is farther from the base of the pinion tooth than from the base of the gear tooth, with a corresponding greater bending moment.) The diagram shows that the bending deflection of the teeth will make the base pitch of the pinion small and that of the gear large, with the resulting premature engagement or interference of the pair of teeth following those that were carrying the entire load, unless the tips of the teeth are relieved, as shown by the dotted lines, to eliminate the interference.

Fig. 3 shows, on an exaggerated scale, deformation of the teeth due to elastic compression of the material at the point of contact. The full lines represent the teeth when not loaded, and the dotted lines illustrate their position when torque is applied to the pinion. The compression or flattening of both the gear and pinion teeth at the point of contact allows the body of the pinion blank to advance, and the teeth next to contact will interfere with each other. Premature contact identical to that caused by the bending deflection will occur.

These two kinds of deformation occur simultaneously, and the sum of the two is the actual amount of deformation. The deformation of the teeth varies with the load, material, heat treatment, tooth form, and type of gear, and all of these factors must be considered in analyzing the deformation and in specifying the amount of relief necessary to eliminate interference or premature contact.

In the foregoing discussion the gears have been considered theoretically correct. Unfortunately, a standard of laboratory accuracy cannot be maintained in commercial production, as the cost would be prohibitive. The amount of tip relief advantageous for theoretically accurate gears is small indeed when compared with that necessary to compensate for errors introduced in production.

Fig. 4 shows checks taken of a gear which is believed to be a good commercial job for industrial purposes. The maximum error in tooth spacing is approximately 0.001 in. and that of the profile only 0.0006 in. It is obvious that the error of 0.001 in. must be compensated for if interference, premature contact, or rapid wear is to be avoided. If the profile error were consistently greater than that of the tooth spacing, the tip relief would have to be such as to care for that, rather than for the tooth spacing error. The errors will, of course, vary with the size of the gear, the size and condition of the generating machine, the kind of gear, and the care taken in the setup and production.

Fig. 5 shows the interference caused by a plus error in the spacing of the gear tooth adjacent to the one in contact. If the error were minus, there would be no interference; but the worst condition must be considered. A tip correction as shown by the dotted line would eliminate the interference and insure smooth and even engagement. Inaccurate tools will give similar conditions of interference. Fig. 6 shows a tooth produced by a generating tool having incorrect pressure angles. Such a tooth might also be produced by a hob that was not centered properly. Tip relief will not correct such errors, but its use will, in many cases, minimize the troubles caused by those errors.

As a rule, when extremely quiet or accurate gears are required, they are made of a soft material, or one which may be cut after the material is heat treated. If hardened gears are necessary for such cases, the teeth are ground. There is a large class of work where the loads necessitate hardened gears, which must run fairly quietly, but where the cost of grinding would be prohibitive. Owing to the tendency of steels to dis-

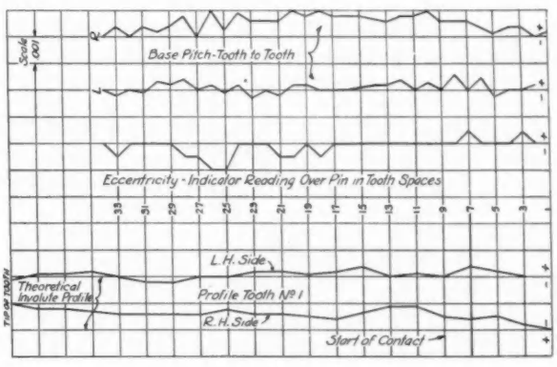


Fig. 4—Gear check taken on a 33-tooth gear with teeth of 4½-in. d.p. and 14½-deg. pressure angle + + + +

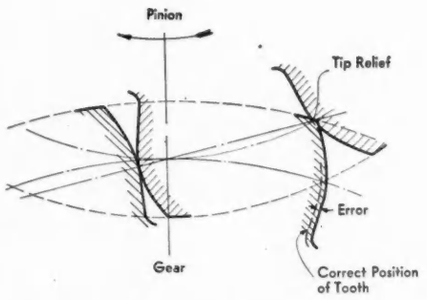


Fig. 5 — Interference caused by plus error in gear-tooth spacing

tort when subjected to the high temperatures necessary for heat treating or hardening, errors additional to these caused by machining are introduced. The body of the blank may expand, contract, become barrel-shaped or out-of-round, or the teeth may lean. The resulting errors in tooth spacing, pressure angle, or parallelism of the teeth will, as a rule, be greater than those created in machining a gear of the same size. The errors will vary with the kind of steel, the treatment, the shape of the gear blank itself, and the tooth form. As an example, a ring gear made from a water-quenching steel and having full depth teeth, will distort much more than a solid-body-type of gear made from an oil quenching steel and having stub-depth teeth of a high pressure angle.

It would seem that the amount of tip relief must be great enough to cover the sum of the greatest errors of distortion and machining, but a more detailed analysis may reveal that under certain conditions they will compensate for each other. There is also a question as to whether the amount of relief should be such to compensate for the maximum or average errors. Fine pitch gears do not require much relief, for the errors are generally less in proportion and their noise is not objectionable. Lightly loaded gears on hand-operated mechanisms require little or no relief.

Having covered the factors that produce interferences, the means of correcting them will now be discussed. Years ago it was common practice to turn off the diameter of the gear until the interference shown by rolling the gears together was removed. That practice had obvious disadvantages, for besides reducing the load-carrying capacity and wear life, the removal of the interference did not always result in smooth running gears.

The lapping in of a set of gears with abrasive compound is sometimes used to remove interferences, but the practice is not satisfactory, because the gears are generally quite noisy when run at full load and speed.

A very satisfactory way of eliminating interference due to errors and compensating for tooth deflection and

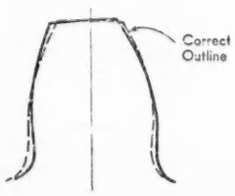


Fig. 6 — Unsymmetrical tooth + +

deformation is that of making the base pitch of the gear shorter than that of the pinion. That is known as "the differential base pitch method," and was discussed at some length in a paper entitled "Normal Pitch, The Index of Gear Performance," presented at the 1925 meeting of the A.S.M.E. by G. M. Eaton. The base pitch of an involute gear is the circular pitch of the teeth measured on the base circle, or the normal distance between the teeth measured along the line of action, and is obtained by multiplying the circular pitch at the pitch circle by the cosine of the pressure angle. A differential in the base pitch of two mating gears is obtained by making the base pitch of the gear somewhat shorter than that of the pinion. As the circular pitch at the pitch line remains the same, it follows that the pressure angle of the gear becomes greater. Such a combination is shown in Fig. 7, where the full lines represent the normal tooth outlines and the dotted lines show a gear having a short base pitch. As the tips of the teeth are thin, interference is avoided.

The differential base pitch method is not practical for hobbed gearing, for its use necessitates hobs of different pressure angles for the pinion and gear respectively, and the cost is prohibitive. It is, however, of particular advantage for ground gears, for the dif-

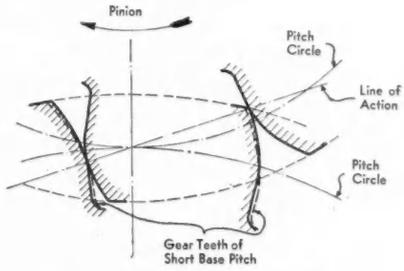


Fig. 7—Showing differential base pitch + + + + + +

ferential may easily be obtained by shifting the formers on a form grinding machine or by changing the wheel setting on a generating grinder. As a base pitch gage or indicator is used for checking the accuracy of the grinding of the teeth, it is a comparatively simple matter to tell when the desired differential is reached. The use of the differential base pitch method for eliminating interference has one great advantage when used on ground gears, in that the exact amount of differential necessary may be obtained by trial without new tools and without ruining several gear blanks.

Perhaps the most common method of obtaining smooth action in a pair of gears is to ease off the tips of the gear teeth to prevent interference or premature contact. That is generally accomplished by introducing a correction in the shape of the generating tool. Fig. 8 illustrates some of the different types of corrections that may be used. For convenience, the basic rack shape of the generating tool has been shown. A generating tool, such as a hob or planer tool, would have a shape identical with that of the basic rack shown; but the shape of a generating shaper cutter would have to be obtained by generation from a basic rack complementary to that shown.

One of the most important factors regarding the

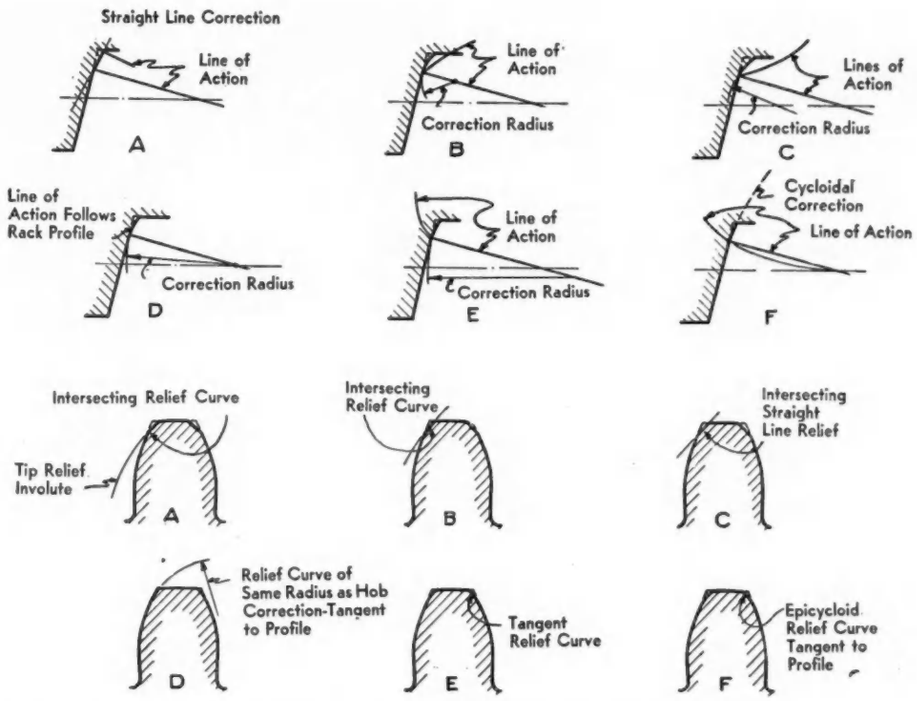


Fig. 8—Various forms of corrections for generating tools and the tip relief produced by them + + + + + + + + + +

choice of generating tool correction to use is the nature of the junction of the tip relief curve with the involute profile on the gear tooth produced. The line of action of the generating tool basic rack profile determines what the junction of the curves will be. The lines of action are drawn for each of the basic racks on Fig. 8, and the gear tooth produced by each is shown below with a corresponding letter for identification.

The desirability of a tip relief curve which will be tangent to the involute profile is obvious, for intersecting curves with the sharp corner at the intersection point are bad from the standpoint of wear, lubrication and smooth engagement when the involute profile does come into contact.

Type A, which is the easiest correction to produce and to calculate, unfortunately does produce a sharp cornered intersection, as shown by the double line of action, there being contact with the tooth being generated simultaneously on each line of action. Types B and C also produce an intersection of the curves, as shown by the line of action, which doubles back on itself with contact simultaneously on each portion. Types D, E, and F produce a correction curve tangent to the involute, but in these types of corrections we do not have the flexibility obtained with Types A, B and C. In other words, when one variable, such as the radial correction, is fixed, the other variable or circumferential correction is also fixed within limits. The question now resolves itself into determining which of the three latter types will give the proper proportions of relief.

Under certain conditions, tip relief has serious disadvantages. Fig. 9 shows two mating gears where the combination of machining errors, distortions, and tip relief on the gear will give what is know as "delayed engagement," which is quite the reverse of the premature contact previously described. The full lines show the position of the teeth when a second pair should just be taking up the load. The plus error in the tooth spacing of the pinion (the gear tooth spacing should be minus) is of such a magnitude that contact of that pair is impossible until the first pair is passing out of engagement, as shown by dotted line positions of the teeth in the sketch. As the pair of teeth carrying the load pass out of engagement, there is a deceleration of the gear through a distance equal to the error, and the second pair of teeth come into delayed engagement with an impact. A succession of those impacts will cause extreme wear and noise. The sketch shows that tip relief, if excessive, will aggravate that condition, and as the impact of a pair of teeth is almost as detrimental as interference, which necessitates the relief, discretion must be used in assigning the amounts of relief necessary. Relieving the tips of the pinion teeth would prevent the delayed contact and impact, but this modification is not practical, because when one generating tool is used for both pinion and gear, enough correction to relieve the pinion teeth sufficiently would produce entirely too much relief on the gear.

The amount of tip relief should never be any greater than that necessary to obtain smooth action and to prevent interference. Continuity of action will be lost if the arc of action is not greater than the circular pitch. Most authorities agree that for smooth action the number of teeth nominally in contact, or the ratio of the arc of action to the circular pitch, must not be less than 1.4. This value gives a basis for the determination of the maximum amount of relief that can be used for any gear ratio. Of course, as the gear ratio decreases, the number of teeth nominally in contact becomes greater and a proportionately higher value should be used as the minimum. It is quite generally agreed that the higher the number of teeth

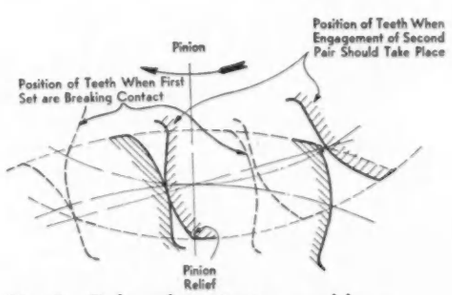

Position of Teeth When Engagement of Second Pair Should Take Place
Pinion
Position of Teeth When First Set are Breaking Contact
Pinion
Relief

Fig. 9—Delayed contact caused by error in gear-tooth spacing + +

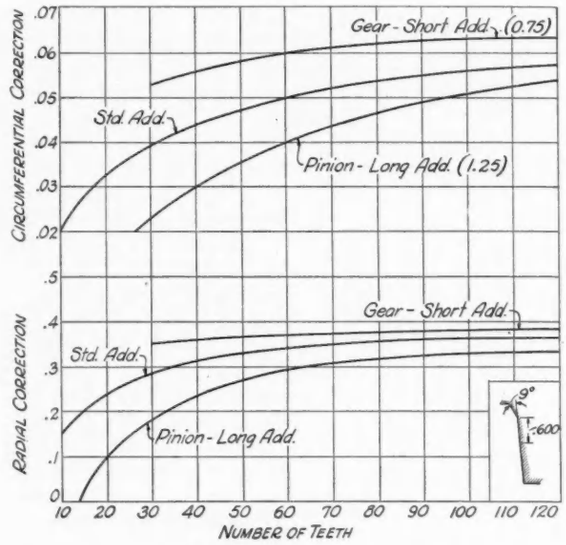


Fig. 10—Tip reliefs produced on gears with different numbers of teeth with a given hob correction + + + + + + +

(One diametral pitch, 14½-deg. pressure angle, involute, standard and long-and-short addendum)

nominally in contact, the smoother and more quiet a gear drive will be. Therefore, it is well to stress the point that the amount of relief should never be greater than actually necessary to compensate for existing errors.

It is not always possible to attain the condition stated in the previous paragraph without special tools. Any generating tool which has a correction introduced for the purpose of relieving the tips of the gear teeth produced will generate a different amount of relief on gears of different numbers of teeth. The full line curves on the graph, Fig. 10, show how the relief produced by a given correction increases as the number of teeth increases. As the relief automatically decreases the number of teeth nominally in contact, the effect of the varying amount of relief on the number of teeth in contact has been plotted in Fig. 11. The number of teeth nominally in contact is much less for gears having relief than for theoretically correct gears. Note that the number of teeth nominally in contact is practically constant where the gear on both pinion and gear have relief.

Relief should be on the gear teeth only, for the following reasons:

1. Interference occurs only at the tips of the gear teeth.
2. Any attempt to eliminate delayed engagement by relieving the pinion teeth will give entirely too much relief on the gear teeth if the same generating tool were used for both.
3. The friction of approach action being greater than that of recession action, it is more desirable to decrease the greater friction to obtain a smooth drive by putting the relief on the gear tips which contact on the approach side.

It is customary to produce long and short addendum gears with standard-addendum generating tools, by cutting to the standard depth from the increased pinion outside diameter and decreased gear outside diameter, the increase in thickness of the pinion tooth equalling the decrease in thickness of the gear tooth. A generating tool designed to give a certain correction on standard addendum gears will not produce the same correction on a set of long and short addendum gears. The relief produced on a short addendum gear with a generating tool which has a given correction will be greater than that produced on a standard addendum gear, if the same generating tool is used, and continuity of action might be lost. The dotted curves in Fig. 10, show the amount of relief produced on both a short addendum gear and a long addendum pinion, in comparison with that produced on gears of standard addendum by the same generating tool. The effect of the change in relief on the number of teeth in contact is shown in dotted lines in Fig. 11, for comparison with the number of teeth in contact for standard addendum gears with and without relief.

The number of teeth in contact of a pair of long and short addendum gears is less than that of a pair of standard addendum gears, whether relief is used or not; but the use of the same generating tool for both types decreases the number of teeth in contact still more for short addendum gears. That is quite undesirable, and generating tools for long and short addendum gears should have special correction.

In the preceding paragraphs, when calculating the number of teeth in contact, an outside diameter at the point where the correction starts was used. This neglects the fact that part of the relieved portion of the tooth is in contact. The additional contact is difficult to calculate and, as it is on the safe side, has been neglected.

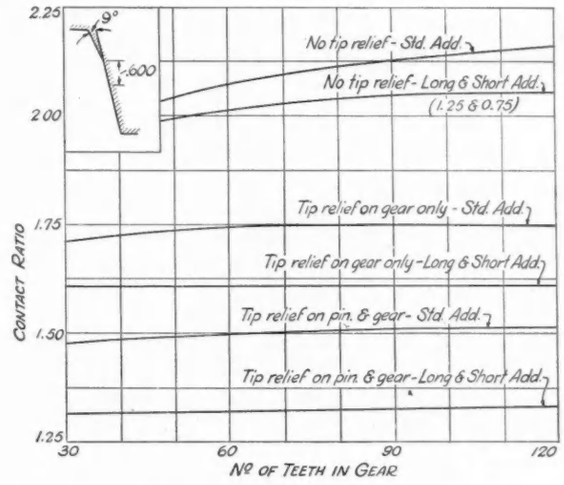

9°
.600
No tip relief - Std. Add.
No tip relief - Long & Short Add. (1.25 & 0.75)
Tip relief on gear only - Std. Add.
Tip relief on gear only - Long & Short Add.
Tip relief on pin. & gear - Std. Add.
Tip relief on pin. & gear - Long & Short Add.
CONTACT RATIO
2.25
2.00
1.75
1.50
1.25
30 60 90 120
Nº OF TEETH IN GEAR

Fig. 11—Numbers of teeth in contact without and with tip relief for different numbers of teeth in gear + + + + +

(One diametral pitch, 14½-deg. pressure angle, involute, standard and short-and-long addendum 30-tooth pinion)

A BOOKLET entitled Metallurgy and Design of Contact Points has been issued by Fansteel Products Co., Inc., of North Chicago, Ill. One of the greatest fields of application of contact points is in interrupters of electrical ignition sets for internal combustion engines, but the booklet lists a great many other applications. Contact points of ignition interrupters at present are made almost exclusively of tungsten. For purposes where not much pressure is available for pressing the points together molybdenum makes a satisfactory contact material.

PRODUCTION LINES

Talking about pressure machining, here is an interesting application at the Decatur Malleable Casting Co. The illustration shows an H-P-M Hydro-Power Press of 250-ton capacity, used to straighten and clean up malleable castings for automotive parts. Wheel hubs shown here, weighing from 8 to 11 lb., are put through at the rate of 700 to 740 per hr. The secret of high output with fine accuracy lies in the hydraulic Fastraverse system characteristic of this line of presses. The cycle is: fast approach to work, slow pressing speed, rapid return

Is it Theory?

Lots of things about chrome plating are still being debated. Some are rather hush, hush. In working for lower costs some experimenters are trying to eliminate steps particularly in polishing which costs more than we like to admit. But one man who is so placed that he knows, says that you can't short cut. He has made experiments to prove his point. His law is that the quality of the finish (where quality is a factor) seems to be dependent upon the number of wheels used. Other theories or hypotheses are solicited by this department.

Keeping Ahead

Just went through some of the most important machine tool plants. There's one impressive thing about them. Although production has been slack, development has gone on with greater vigor. Without exception these companies have new things up their sleeves. We wish we were free to tell you about some of the machines on the way. This much we can say—the new stuff will cut costs below anything on the market today.

Sources of Profit

One of the best talks we have heard recently was the one by W. A. Halbrooks, comptroller of Armstrong Cork. At the October meeting of the Production section of the Philadelphia S.I.E. he discussed in detail the functions of budgeting for profit. Armstrong practice in this respect is quite similar to the best practice in the automotive field. An outstanding feature is that of keeping foremen and other factory executives in close touch with costs by providing with reports at regular intervals. An analysis of fixed and variable costs was also stressed.

Turning Steel

Moderation is the order of the day in the exploitation of tantalum carbide for turning steel. Certainly this is a healthy condition, indicating that we do learn from experience. When makers of tantalum are ready to push it they will have available a wealth of information concerning advantages and limitations. But we can report that tantalum is being widely tested. And from words dropped here and there we know that it has shown remarkable results on certain steel-turning applications.

Chiefly Synthetic

Many of us have wondered just what is the significance of synthetic resins. Utilization in the automotive industry has grown by leaps and bounds. But what is the broad economic picture? Here's how it affects the coal-tar industry according to Number 41 of "Commerce Reports." In 1930 the production of phenol (only one of the by-products used) was over 21,000,000 lb., worth more than $2,000,000.

Millions and Millions

When it comes to amplifying leave it to General Electric engineers. They recently showed a combination of a low-grid-current tube and Thyratron. The device amplified ten quadrillion (ten thousand million million) times. A static charge produced by rubbing an amber rod was sufficient to turn on and off an incandescent lamp.

Is This Progress?

Years ago automotive manufacturers, at least, agreed that progress depends wholly upon cooperation. Improvements in process, in quality, and in cost, have come about through interchange of ideas. Some time ago, one of our good friends asked us about metal polishing. Wanted to know why the apparent lack of standardization. Why some of the latest methods and equipment have not been widespread in use. We have an idea after making a little survey by ourselves. Maybe we need more cooperation—more ideas exchanged in this branch of activity.

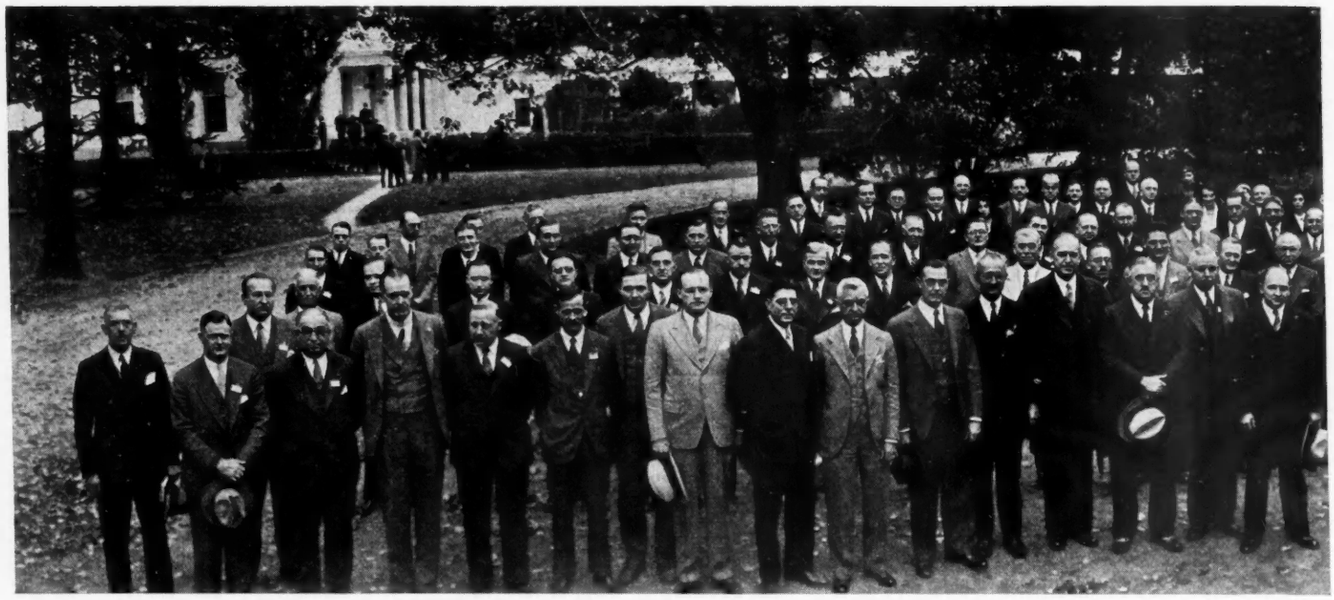
1929 Figures

According to W. H. Rastall, chief, machinery division, Department of Commerce, machine tool builders sold $240,000,000 worth of tools in 1929. Of this, our gigantic industry took $96,000,000. Quite a sizeable proportion, considering the other industries that are operating.

Supervision

Armco's "Foremen's Bulletin," Vol. 2, No. 40, stresses another attribute of a good foreman. How much supervision does he require? Obviously, a man's value to his employer increases as the amount of supervision decreases. Well worth telling your men.—J. G.

MANUFACTURING MANAGEMENT METALLURGY



Wednesday noon President Hoover received the S.A.E. members. The afternoon

Engineers and Operators Meet in Transportation Session of the

by George T. Hook

THE ninth annual Transportation Meeting of the Society of Automotive Engineers, held in Washington, D. C., last week, must go down in the records as the most constructively critical—and, therefore, the most successful—ever held.

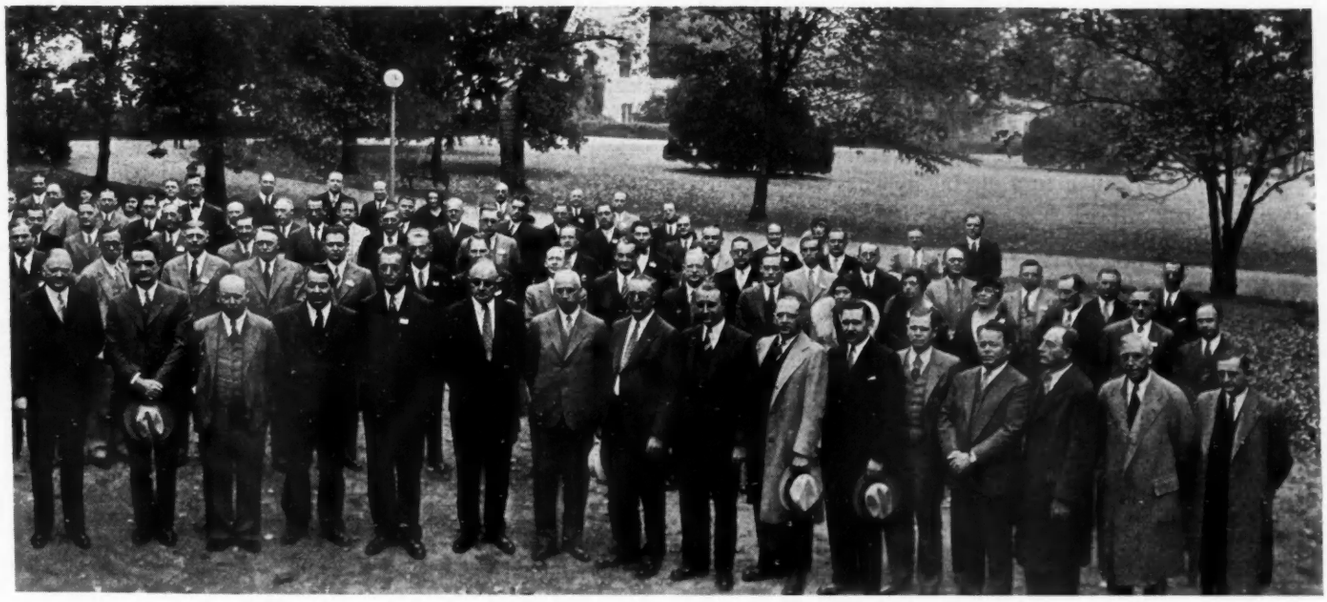
Attended by an unusually articulate aggregation of truck operators, engineers and factory sales executives, the sessions, each of which was extremely well attended, were devoted to relations of truck manufacturers with fleet operators; Diesel engines, chassis lubrication, legislative activities, coordination of rail and highway transportation, bus body problems and the trend of fleet maintenance practice.

The Washington atmosphere is notoriously conducive to loquacious debates, but this actuality, no matter how well-founded, cannot explain the fact that the S.A.E. discussions were constructive, temperate and frank. It must be conceded, therefore, that the real inspiration came from the choice of topics on the three-day program, and the manner in which the principal speakers prepared their papers. Historical monologues—those breeders of snores and shoe-shuffling which blighted many a past meeting — were conspicuously absent. The speakers marshalled present-day facts and built their arguments around them.

They adorned their facts with personal opinions and thus established a precedent which members and guests were quick to adopt.

The outcome of the opening session augured the success of the ninth annual meeting. T. L. Preble, sales manager of the Pierce-Arrow division of the S.P.A. Truck Corp., had the opening spot with "Some Problems of the Motor Transportation Executive." Mr. Preble covered a variety of problems but those which stimulated discussion dealt with relations of the manufacturer with operators. Salesmanship was first to come under Mr. Preble's critical eye.

"The industry," he said, "is still afflicted with salesmen who are under-trained for their jobs. The fault lies as much with the manufacturer as with the man. As the superintendent of a large fleet recently said: 'As far as I am concerned, I don't want to talk to any more salesmen—send me an engineer, or at least a service man. I want to talk to somebody who will really *contribute* to my knowledge of motor transportation problems. The average salesman shows me a pretty catalog, gives me the same old line and when he has gone, I find that I simply lost a half hour of valuable time.'" This led Mr. Preble to the conclusion that a truck salesman, in order to eliminate hot doorknobs, must be able to dominate his conversations with customers through his superior knowledge of motor vehicles and highway transportation and through his ability



was devoted to an inspection tour of the National Bureau of Standards

Frank Debate at the Ninth Annual S. A. E. at Washington, D. C.

to apply his knowledge to the needs of customers.

To assist in the installation of the proper unit Mr. Preble submitted a questionnaire covering practically every detail needed in the selection of the right truck and recommended its adoption by the S.A.E. and urged its use by transportation executives and manufacturers.

The importance of direct contact with the field by manufacturers was stressed by the speaker. He took a healthy rap at designing engineers which later seemed to have the approval of operators.

"By all means," he declared, "buyers and sellers should be closer together in matters of transportation and design research. For one thing, it is incumbent upon the manufacturer to insist upon his engineers spending more *personal* time with motor vehicle buyers, both large and small. Calling upon a great number of buyers, the engineer will receive many conflicting and contradictory statements, but nevertheless he will observe trends and he will receive many a splendid suggestion from the operating man. Too often does the manufacturer's designing engineer cloister himself in his own office and depend upon his examination of competitors' specifications and his conversations with his own personnel instead of personally exposing himself to the man who ultimately pays his salary—the customer."

In order to assist the manufacturer and his engineers further, and at the same time benefit the customers, Mr. Preble suggested the desirability of a super-committee "composed of delegates from each major trade association for the purpose of discussing problems which are important to the owner and manufacturer alike." Through the clearing house of ideas which would naturally result there would "emerge a clearer composite picture for the benefit of the manufacturer for his guidance in design and manufacturing problems; guesswork would be largely eliminated, and customers' requirements would be more scientifically met."

"The procedures recommended," he believed, "would eventually more thoroughly impress the manufacturer with the necessity of instituting basic systems of design which would permit far more flexibility (in respect to supplying customers' needs) and at the same time a minimizing of his internal problems of inventory and manufacture."

Subsequent discussions of this paper revealed that Mr. Preble criticized nothing and recommended nothing with which his audience was not in hearty agreement. Several of the operators, with pardonable egotism, doubted whether salesmen could ever know as much about their transportation problems as they knew. And since operators possess the combination to this particular vault, the answer unquestionably

is that salesmen must depend upon the cooperation of operators. If Mr. Preble hadn't provided his hearers with a choicer vent for criticism, it is probable that salesmen would have been severely subjected to the slings and arrows of outraged operators. As it was, the audience had more important quarry in manufacturers and their engineers.

A. J. Scaife, consulting engineer, The White Company, and president-elect of the Society of Automotive Engineers, admitted that the truck manufacturer has not taken advantage of opportunities, and possibly might have saved himself a lot of unnecessary manufacturing expense by analyzing the needs of parties which use the products he makes.

"The manufacturer's duty is to find out what the customer wants to do," he said, "and then meet that problem. We have made vehicles to suit our own ideas and not to suit the job the vehicle has to do."

F. C. Horner, of General Motors Corp., seconded the observation that there was too much staying in the office on the part of factory engineers. "The truck, it seems, is something the buyer must use because we designed it. If something goes wrong the fault is with the buyer because he doesn't know how to use it. Lots of manufacturers would be better off if their designing engineers spent more time in the field than in the office. No question that they can learn a lot from scientifically operated fleets."

These statements are typical of the advice—perfectly true and perfectly harmless—which others indulged in. The fact that a number of designing engineers and one factory president were present, but advanced no objections, must be taken as indicative of their approval of the idea of field contact. Actually the idea is one which, in its theoretical aspects, cannot logically be disputed. Its practical aspects may be argued by some executives, but even they can muster no satisfactory excuse to answer the complaint of J. B. Pymer, of the City Baking Co., Baltimore, who said he had tried to get the assistance of a half-dozen executives of different companies and had found only one who was willing to discuss with him what a baker might need. "Laziness" was the particular affliction with which he labelled them. Moreover, while it must be recorded that T. C. Smith, of the American Telephone & Telegraph Co., came to the defense of manufacturers with the confession that in the last year or two he has received exceptionally good cooperation, this circumstance may simply open manufacturers to the suspicion that they are liberally cooperative only with big fish.

The super-committee of trade association representatives to deal with transportation problems won recognition without dispute. Mr. Horner merely urged that an effort be made to get men on the committee who would discuss frankly the problems dealt with.

Approval also was given the questionnaire recommendation. D. C. Fenner, of the Mack Co., said the questionnaire, if properly handled, offered solution of many difficulties. He suggested, however, that the questionnaire include "points which determine size, weight and other characteristics of the body, because until these facts are known it is utterly impossible to determine what chassis shall be put under the body."

By far most pulsating was the session devoted to the Diesel engine and chassis lubrication. This was

A. J. Scaife—

We have attempted to correct faulty design with different kinds of oils and greases

We have been unsound in working on the effect instead of concentrating upon the cause of troubles

due, in the case of the first topic, to the characteristically withering argumentation of Col. G. A. Green, chief engineer, General Motors Truck Corp., and in the case of the second to the well-defined convictions of operators.

Col. Green reported the voluminous results of comparative dynamometer and road tests of a heavy-duty Diesel and gasoline engine. Voluminous is the proper term because his "paper" would make up into a good-sized volume. The tests were exhaustive and, as one man guessed, must have cost in the neighborhood of $10,000. Upon the results of his tests, Col. Green based the following conclusions:

1. For heavy-duty truck or coach operation, if operators are satisfied with less acceleration, marked fuel economies will result with Diesels.

2. If operators demand present acceleration standards, much larger Diesels are necessary, and before they can be produced much experimental work is necessary. Moreover, within the capacity range of today's heavy-duty designs, the larger the Diesel the less attractive it will be from a fuel economy standpoint.

3. From a fuel economy standpoint the Diesel shows up to better advantage in city than in parlor-car service. Indications also are that better performance will result in conjunction with gas-electric. Advantage then can be taken of electrical characteristic and lower E.R.P.M.

4. Average operator will be interested in fuel bill reductions. But considering Diesel increased first cost, maintenance cost, weight, space occupancy, roughness, noise and smoking, a sympathetic public is doubtful.

5. Further development work is required before satisfactory Diesel exploitation can be commenced in this country.

Participating in the discussion by means of a telegram, H. L. Horning, president of Waukesha Motor Co., covered a point which had perplexed many in the audience. "I cannot understand," he wired, "why Green's Diesel smokes so badly and accelerates so poorly. Perhaps it lacks organized turbulence." Moving pictures of the Diesel under road test were shown and it did, indeed, belch smoke like a seagoing tug. Compared with other Diesels in use in this country, the Diesel tested by Col. Green was uncommonly faulty in this respect. Mr. Horning also expressed a common wonder in regard to the poor accelerating qualities of the tested Diesel. It amazed him because he thought acceleration was an inherent characteristic of a Diesel engine.

Further development work, as Col. Green con-

cluded, unquestionably is necessary before the Diesel engine can hope for success in this country. Fortunately such work has been in progress during the two years which have elapsed since the A.E.C. Diesel tested by Col. Green was brought out, and several companies are on the verge of making announcements. In this development work, as Mr. Horning very aptly pointed out, European Diesel accomplishments are no criterion because European standards of performance are amateurish when compared with American.

Col. Green's chief antagonist in the discussion was J. Kuttner, engineer, of New York City. He endeavored to dispute the colonel's findings by submitting the results of tests made by Paul Langer, German professor, on six Diesels and six gasoline engines. These, according to Mr. Kuttner, gave "experimental verification of the Diesel's astonishingly superior pick-up, its ability to drive at considerably lower speeds in high gear without danger of stalling, and its ability to accelerate and pull a vehicle with about 75 per cent of the fuel consumption required to accomplish the same result with a gasoline motor."

Col. Green quite properly denied there could be any dispute with his statements since they were the results of impartial tests dealing solely with a particular Diesel and a particular gasoline engine. He made it plain that he had not closed his mind to Diesels and declared he would be glad to subject all Diesels to the same test he gave the A.E.C. on one condition, that he be permitted to publish the results. And "don't think," he enjoined his listeners, "that the four-cycle gasoline engine is dead and ready for the scrap heap. Not by a long shot."

Chassis lubrication, one gathered from the evidence in Mr. Scaife's paper and subsequent discussion, has become one of those things you've got to say with a smile if you don't want to start a fight. There's good cause for this general feeling when you consider that it's not unusual for a manufacturer to specify the use of a dozen or more different grades of lubricant. Lubrication, operators admit, has become one of their greatest burdens and what they seek are developments, either in engineering design or lubricant manufacture, which would reduce lubrication requirements to not more than three grades.

The fond hope of commercial vehicle operators is that the chassis of the future will have centralized automatic lubricating system and thus effect big savings in time, trouble and expense.

As M. C. Horine, sales promotion manager of Mack, frankly and tersely stated, "It is easier now to make a part work with a special lubricant than with special engineering—a lot easier and a lot cheaper." In designing he saw the need for working toward simpler types of lubricants.

Mr. Scaife was no less frank and no less terse when he said, "We have been trying to correct faulty design with different kinds of oils and greases; we have been working on the effect instead of the cause." This complaint was echoed by L. V. Newton, automotive engineer, H. M. Byllesby & Co. "As vehicles are now designed there is a need for special lubricants," he said. "Manufacturers should consider some sort of design that would eliminate various lubricants. If we can end up with a central lubricating magazine, it will unquestionably save much time and trouble."

Another suggestion was offered by A. W. Scarratt, chief engineer, International Harvester Co. His idea was that "if in design work we endeavored to effect means whereby 80 per cent of the lubricant were retained by the part for which it was intended instead of being squirted on the floor, we'd be doing a lot of good."

All of which indicates there is an abundance of proof that if lubricant makers cannot perfect a few lubricants to do the work as effectively as the many in use today, engineering can bring salvation by improvements in design. Work along the latter line is necessary, because as a factory man quoted by Mr. Scaife stated: "We can safely predict that the time will come when it will be absolutely necessary for vehicle designers to settle upon perhaps not more than three different lubricants to be used for the standard vehicle and then to select the higest type of available lubricants and deliberately design all of the parts to function efficiently with such lubrication."

A bus duet, which might be entitled "Relation of the Motorcoach Body to the Chassis and Vice Versa," was presented by W. C. Naegel, chief engineer of the Bender Body Co., and G. H. Scragg, of the Mack Company. They recited separate verses but got together on a chorus to the effect that motorcoach-design characteristics today must be conceived as a unit with the requirements of the body as the principal factors influencing the design. To what extent this line of progress will modify conventional motorcoach outlines and details of construction is indicated, Mr. Scragg said, "by the work already accomplished in chassis of the hoodless mass-transportation type; even on the more conventional types greater compactness is being secured by straddle-type dashes, semi-forward-type controls and engines specially designed for longitudinal compactness."

But it wasn't in construction influences that operators were interested. During the discussion period they completely disregarded the papers and asked pertinent questions that bore on improvements in passenger comfort. And, it must be admitted, in every case the engineers had forward-looking answers.

F. C. Horner—

Engineers should get out of drafting rooms and learn something from fleet operators

Bigger fleets get personal factory service, but small operators are neglected

Next Week—

Mr. Hook will tell more about this most successful meeting in Automotive Industries

Broaches for Internal and Important Part in Precision

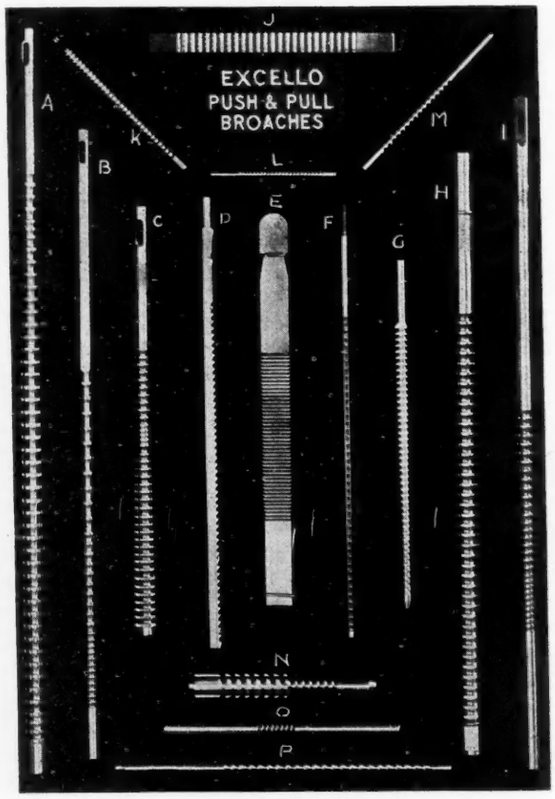


Fig. 1 — A representative group of broaches used in the automotive industry

Properly designed holding fixtures and loading methods can be simplified to increase production and permit many parts formerly milled to be surface broached + + + + + + +

by John E. Wells
Ex-Cell-O Aircraft & Tool Corp.

THE use of broaches for the finishing of holes has been standard practice for several years. During the past few years, great strides have been made in the different types of broaches for the finishing of work to close tolerances on a high production basis. Until recently it was thought that broaches could only be used successfully for internal work. Internal broaches can be of either the push or pull type and have been developed until a high finish and extremely close tolerances are possible in production.

With the introduction of the precision transmission for the modern automobile, and the factory executives' efforts to reduce their costs, the efficiency of the broaches and broaching machines is greatly increased. The broach machine manufacturers have developed suitable machines of the vertical and horizontal type in various capacities up to 75 tons. A similar development was also made in the heat treating equipment necessary for the manufacture of broaches.

Broaches of the internal type are now being used on single and multiple keyways and splines, rectangular, square, hexagonal, T-shaped and various other shaped holes. Production requirements are increasing daily with the result that more manufacturers are constantly turning their attention to other types of broaching such as surface and external. Suitable holding fixtures are required with this type of operation. By properly designing the holding fixture, the method of loading and unloading can be simplified to such an extent that a marked increase in production is possible. These developments now permit many parts that were formerly milled to be surface or externally broached for a small fraction of the cost by the former method.

Through the cooperation of the steel companies, the broach manufacturers have been able to secure material that is best suited for each individual application with the result that the cost per hole or piece has been greatly reduced. The machine tool equipment available for turning, milling and for cylindrical spline and surface grinding enables the broach manufacturer to maintain an accuracy and finish that was unheard of a few years ago. This not only increases the actual life of the broach but has reduced scrap and has increased production with better finishes on the

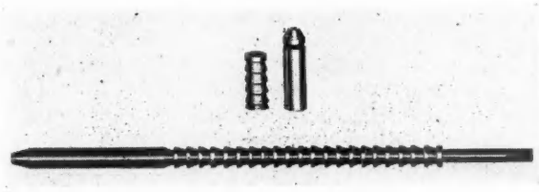


Fig. 2—A broach with a renewable finishing section. Renewable section in rear pilot shown above broach proper

External Use Play a Very Work at Automotive Plants

part, to the more accurate limits that manufacturers are holding today.

One of the most important operations in the manufacture of a broach is the heat treatment. On long pieces of steel there is a tendency to distort during the heat treatment. Vertical electrically controlled furnaces have been developed which reduce this distortion to a minimum. This type of furnace is being used for extremely long broaches. The short broaches in most cases are heat treated in the horizontal type of furnace. With the development of these different types of furnaces a uniform hardness can be held which is essential for life and accuracy of the broach when placed in production.

The design of each broach is determined by the material to be broached, type of hole (cored or drilled), the production required and the type of machine with which the broach is to be used. Figure 1 shows a group of broaches representing different styles and shapes that are common in the industry. At *A* is shown a pull type spline broach used for broaching a clutch disk hub. *B* is a round pull broach for broaching the round hole in the front axle I beam. The burnishing section shown on the lower portion of this broach can be easily seen. A serrated broach of the pull type is shown at *C* for broaching the serrations in a steering knuckle. The keyway broach shown at *D* is ¼ in. by ⅛ in. for broaching a keyway 1 in. long. *E* is a rectangular broach for broaching the brush box of a generator. *F* is a keyway broach for broaching keyways 3/16 in. by 3/32 in. by 1¼ in. long. *G* is a square push broach for broaching the square holes in machine handles. *H* is a hexagonal pull broach for broaching wrenches. *I* is a round pull broach for broaching the kingpin holes in the front axle spindle of an automobile. At the top of this group are shown four push type broaches. *J* is a flat serration used for broaching the serrations in slots of a milling cutter body. *K* is a small square broach for broaching square holes in aluminum bearings. *L* is a round burnishing broach for burnishing holes in bushings. *M* is a round broach for broaching a hole in the rear camshaft bearing. At the bottom of this group is a spline burnishing broach shown at *N* for burnishing transmission gears after heat treating. *O* is a round burnishing broach of the push type for burnishing the hole in transmission gears after they are bronze-bushed. *P* is a round pull type broach for broaching bronze bushings.

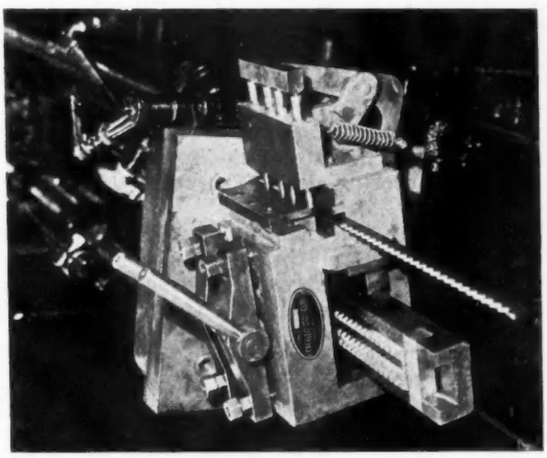


Fig. 5—A fixture designed to take a range of broaches + +

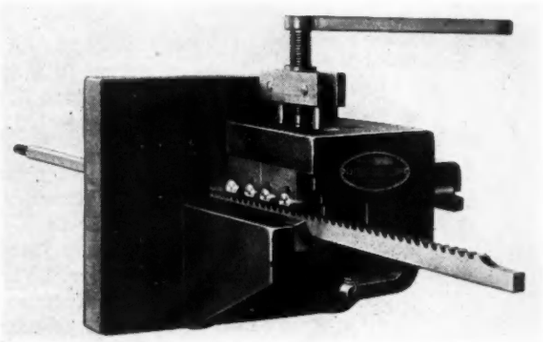


Fig. 4—A fixture and broach for broaching the flats on transmission shifter parts

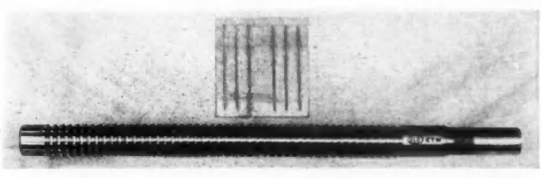


Fig. 3—Photo comparing range in sizes of broaches

In addition to the solid type of broaches, there has been considerable time spent developing broaches with a renewable finishing section such as shown in Fig. 2. This type of broach is particularly adapted for applications where very close limits must be held. Usually the life of a broach with such close limits is very short. The limits on the broach shown above is 0.0001 in. and removes approximately 0.018 in. stock in each pass. As the broach wears undersize the finishing section or shell which is shown directly above the broach is replaced with a new section, thereby making a material saving in cost as compared to the cost of the solid type broach.

In the manufacture of this type of broach each part must be held to very close limits. The inside diameter of the shell and the outside diameter of the pilot must be held so that upon assembling, the shell and rear pilot are in perfect alignment with the roughing teeth. If the removable section does not line up with the rest of the broach it will not function properly and a rough hole will result.

The range of holes that can be broached is far greater than is normally considered. Fig. 3 shows an extremely small set of broaches that can be easily compared with the large 16-spline broach that is used for cutting internal gear teeth in steel parts. This broach is made from high-speed steel and can be run approximately 30 ft. per min. The length of this broach was decreased approximately 15 per cent without shortening the life of the broach. This decrease, due to engineering design, permitted an increase in production.

The small broaches shown above the 16-spline broach are made in sets of three, a rough, semi-finish and finishing broach for broaching holes 0.093 in. square in aluminum. The production on this job is approximately 170 pieces per hour. In Fig. 4 is shown a fixture and broach for broaching the flats on four

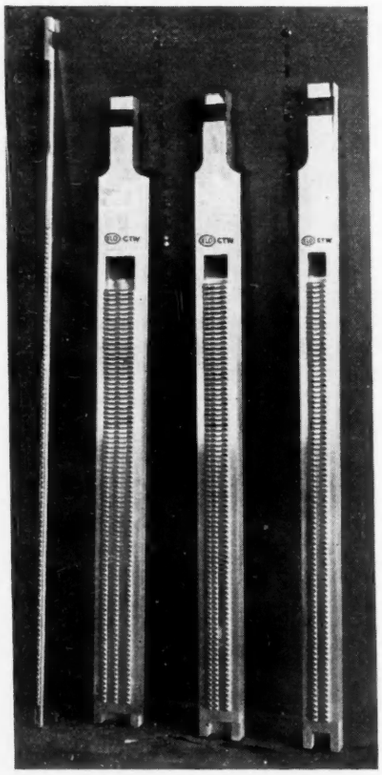


Fig. 6—The broaches were designed to be used with fixture shown in Fig. 7

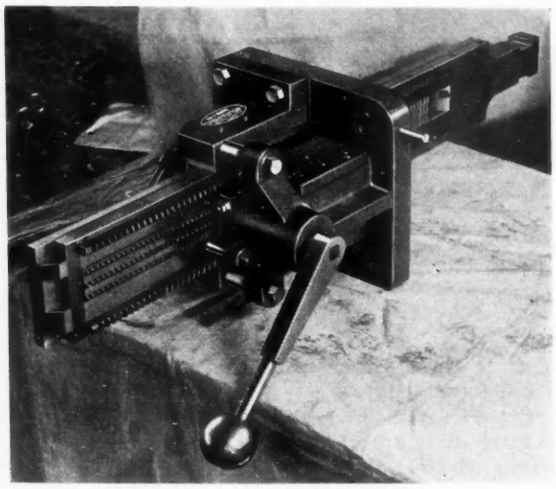


Fig. 7—Broach and fixture for broaching shifter rails + + + + + +

transmission shifter parts in one operation. The parts are round and a flat ¼ in. deep is cut on the side and at the end of each part. A quick clamping fixture is provided for holding the four pieces in position and by means of a foot lever they are ejected after the broaching operation. The fixture is designed for mounting on a horizontal hydraulic broaching machine.

The broach furnished with this fixture is of the pull type and is approximately 4 ft. long and is made from high-speed steel. The limits allowed on the slot are 0.0002 in. on the width and 0.0002 in. on the height. The broach guide in the fixture is hardened and ground to very close limits to insure accuracy of the broach during the broaching operation.

In designing fixtures for a certain class of job, flexibility can be incorporated as shown in Figs. 5 and 6. The close-up view of this fixture shows a large broach and a simple keyway broach in position. Through the use of suitable broach guides or filler plates, any of the three large broaches shown in Fig. 6 can be used in this fixture. Four parts are loaded from the left-hand side of the fixture and locked in position by a cam action from the top. After the parts are broached the cam action unlocks these parts and they are automatically ejected. The fixture was designed to be used on a hydraulic broaching machine.

The keyway cutter bar shown in the left of the group of broaches in Fig. 6 was designed for cutting a slot 7/32 in. deep by ⅛ in. wide. The next three broaches are interchangeable in the fixture as mentioned above. The transmission parts to be broached require different combinations. The keyway broach is always used with each of the large broaches. These broaches are used by a large automobile manufacturer for broaching their shifter rods.

These broaches are of the replaceable section type which consists of a broach holder and six broach sections placed end to end. This type of broach permits the replacement of the section which is worn undersize, which, normally is the finishing section. To renew this broach the finishing section is removed, the remaining five sections moved forward and a new section inserted on the end opposite the finishing section. After they are locked in place the entire broach is reground and it is again ready to be placed in operation. On severe applications, where the finishing sec-

tion is soon worn undersize, this type of broach will affect a material saving, as the one section represents but a fractional cost of the complete broach. Construction of this type of broach requires unusual accuracy in its construction throughout. Not only must the form be ground absolutely true in order to produce a smooth hole, but each of the component parts must be held to the exact size to eliminate any chance of misalignment or lack of rigidity.

In Fig. 7 is shown another type of fixture which is designed to use one size of broach only. Four parts are loaded in this fixture from the top and are locked in place by a cam action. The same cam also releases the parts and permits them to drop through the fixture after the broaching operation.

The set of two broaches shown in Fig. 8 are interchangeable and are for use with the fixture shown in Fig. 7. Each of these broaches are the same length, width and thickness, the only difference being the different spacing of the three grooves with respect to the two outside slots. They are designed for broaching the grooves in shifter rails. The former method of doing this job was milling. In some cases a saving as high as 80 per cent was made. These broaches incorporate the same accuracy and economies as those shown in Fig. 6, with the exception that they are more complicated. Each of the sections on this broach are hardened and accurately ground as they must be held in absolute relation with each other and the grooves and slots also must be held in definite relationship to each other.

On the latest requirements for the automotive industry is a combination broach which will broach both a round surface and splines in the same operation, the face of each spline to have a perfect involute tooth form for internal gears. By the development of this type of broach, not only are new fields opened, but a marked saving can be made over previous methods for obtaining the same results. In Fig. 9 is shown a group of three combination broaches used for broaching internal transmission gears. The section at the pull end broaches the inside diameter of the internal gear and the next few teeth between this section and the spline section are used for finishing this diameter. The balance of the broach is used for cutting the teeth, each of which have a perfect involute form.

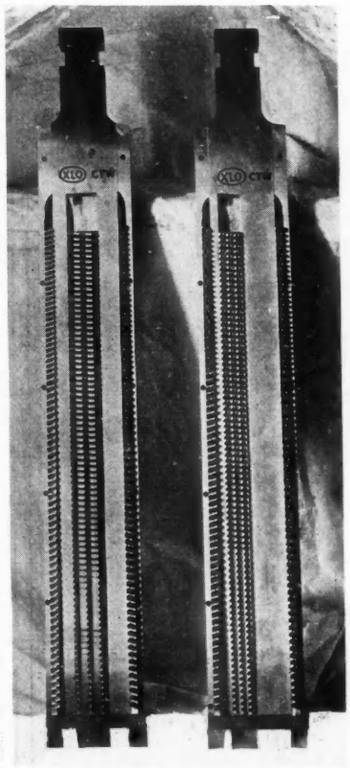


Fig. 8—Set of broaches to be used with broaching fixture in Fig. 7 + + +

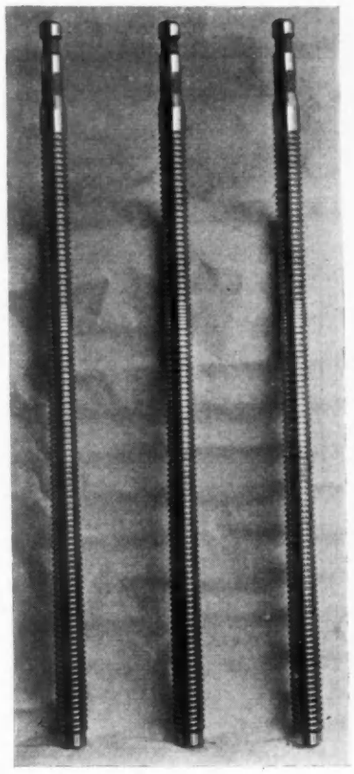


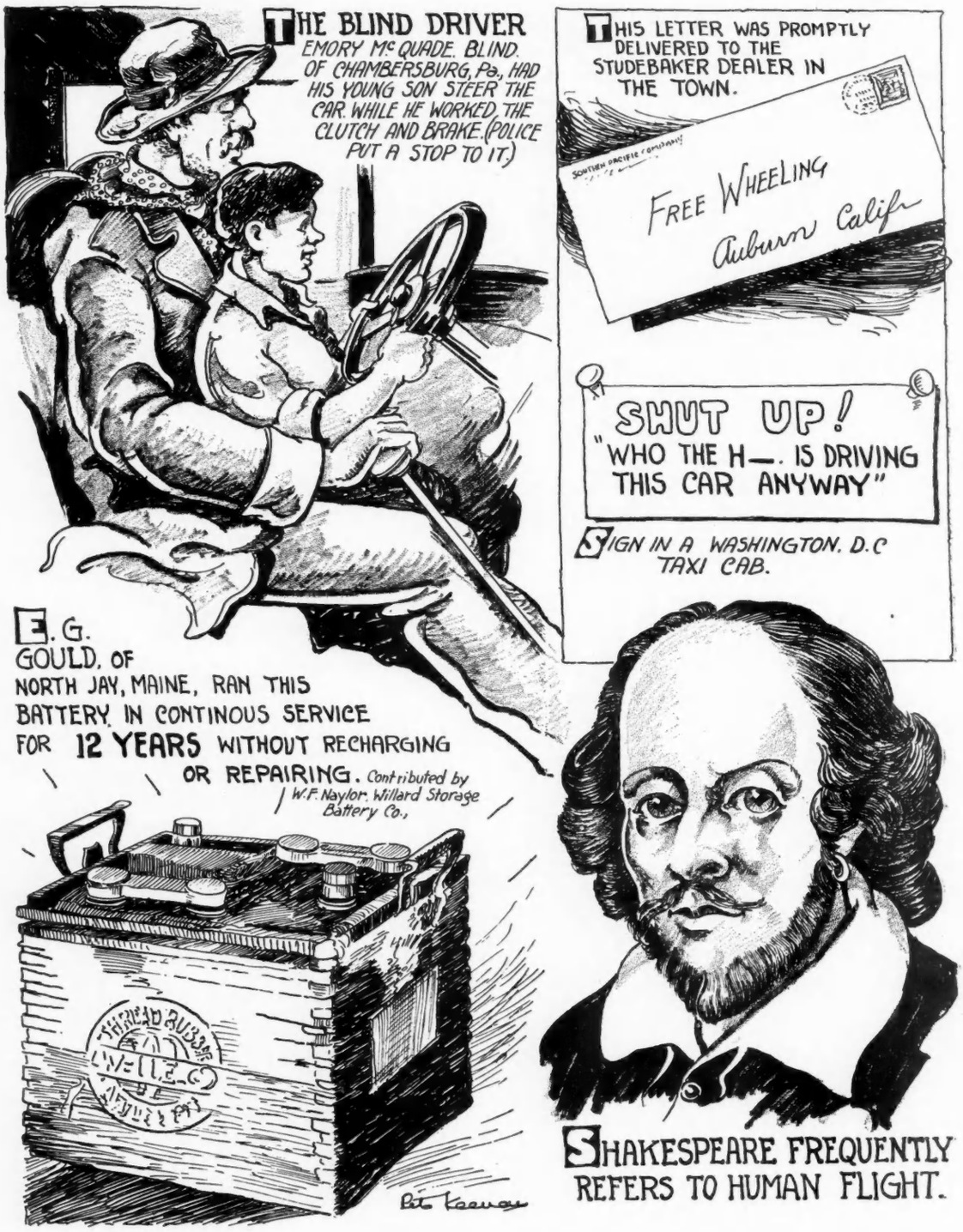
Fig. 9—A group of combination broaches for broaching internal transmission gears + +

This broach starts with a drilled hole and finishes the operation complete, no further grinding, burring or similar operations being required. The teeth in each row must be absolutely straight to insure accuracy and finish. Limits on the splines are held within 0.0003 in. which is measured by placing two balls 180 deg. apart on the diameter and measuring across these balls. The outside diameter of the broach is held to 0.0001 in. and the accumulative error in the teeth must not be greater than 0.0002 in. The first section of the broach removes approximately 0.045 in. stock. The pull end is designed for an automatic coupling which simplifies and expedites the handling of the broach during the broaching operation.

In the above description of the different types of broaches only a single broach was described. In designing broaches they are generally made in sets according to the type of work they must handle. These sets run as high as eight in number, each broach removing a certain portion of the material. This is particularly true on surface or external broaches with intricate forms. Many times, however, a multi-operation broach can be designed. Drift bearings are often incorporated in a broach of this nature where the part is of unusual length, which in turn enables a straight hole to be broached concentric with the outside.

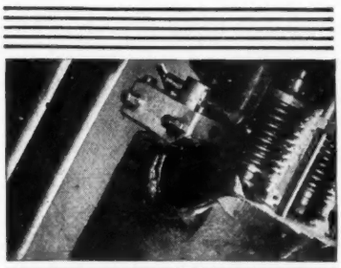
With the rapid strides in the broaching field many of the milling applications in the past are being broached today with increased production, greater uniformity, accuracy, lower costs and better finish.

Automotive Oddities—By Pete Keenan

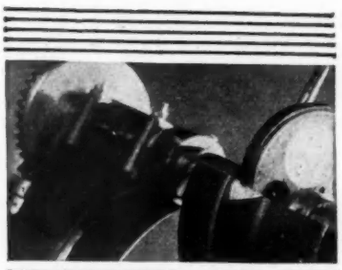

THE BLIND DRIVER
EMORY Mc QUADE. BLIND. OF CHAMBERSBURG, Pa., HAD HIS YOUNG SON STEER THE CAR WHILE HE WORKED THE CLUTCH AND BRAKE. (POLICE PUT A STOP TO IT.)
THIS LETTER WAS PROMPTLY DELIVERED TO THE STUDEBAKER DEALER IN THE TOWN.
FREE WHEELING
Auburn Calif
SHUT UP!
"WHO THE H—. IS DRIVING THIS CAR ANYWAY"
SIGN IN A WASHINGTON, D.C TAXI CAB.
E. G. GOULD, OF NORTH JAY, MAINE, RAN THIS BATTERY IN CONTINOUS SERVICE FOR 12 YEARS WITHOUT RECHARGING OR REPAIRING. Contributed by W.F. Naylor, Willard Storage Battery Co.,
SHAKESPEARE FREQUENTLY REFERS TO HUMAN FLIGHT.

Do You Know An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



New Speed Records

CERTIFIED BY THE INTERNATIONAL ASSOCIATION OF RECOGNIZED AUTOMOBILE CLUBS, PARIS

Sept. 9, at Montlhery—Eyston and Denly, driving a Riley, 1093.2 cc. displacement, standing start: 104.20 m.p.h. for 200 miles. International Class G record.

Sept. 17, at Montlhery—Eyston driving M.G., 748 cc. displacement, standing start: 91.51 m.p.h. for 100 kilometers. International Class H record.

Sept. 25-26, at Montlhery—Bourlier, Senechal, and Frettet driving a Delage, 4050 cc. displacement, standing start: 500 kilometers at 111.76 m.p.h.; 500 miles at 111.23 m.p.h.; 1000 kilometers at 109.42 m.p.h.; 1000 miles at 103.78 m.p.h.; 2000 miles at 97.43 m.p.h.; 3000 kilometers at 97.22 m.p.h.; 3 hours at 111.61 m.p.h.; 6 hours at 108.97 m.p.h.; 12 hours at 100.81 m.p.h.; 24 hours at 95.52 m.p.h. International Class C records.

Sept. 25, at Montlhery — Eyston driving M.G., 748 cc. displacement, standing start: 50 kilometers at 98.71 m.p.h.; 50 miles at 99.83 m.p.h.; 100 kilometers at 100.31 m.p.h.; 100 miles at 101.09 m.p.h.; 1 hour at 101.11 m.p.h. International Class H records.

Oct. 15, at Montlhery—Mrs. Stewart driving a Derby Special, 1670 cc. displacement, standing start: 200 kilometers at 121.75 m.p.h. World's record.

Oct. 15, at Montlhery—Mrs. Stewart driving a Derby Special, 1670 cc. displacement, standing start: 100 miles at 121.64 m.p.h.; 200 kilometers at 121.75 m.p.h. (duplicate of world's record above); 1 hour at 121.75 m.p.h. International Class E records.

Survey Nears End

WASHINGTON, Nov. 5—Field work on the survey of motor truck operations being conducted by the Motor Transport Division of the Bureau of Public Roads and the Bureau of Foreign and Domestic Commerce has been about completed, and the results of the survey will be available in pamphlet form about the first of next year, according to information received today. The survey will be divided into two parts, one covering the operation of contract carriers, and the other the operations of common carriers. The survey, which covers practically all the states, is based principally upon interviews with carriers, and covers such subjects as maintenance costs of vehicles, mileage run, extent of operations, etc.

ALFRED SWAYNE, v.p. of G.M., will be the featured speaker on the banquet program of the Overseas Automotive Club, when it gets together at the joint show of the M.E.A. and N.S.P.A. at the Hotel Traymore, Atlantic City, Dec. 9. If Mr. Swayne's recent utterances are any guide, he will be able to consistently take a very optimistic position when he talks to the club.

A. W. Childs, chief of the automotive division in Washington, is recuperating from an injury to his knee muscles, which was suffered on his recent trip through the Middle West. Mr. Childs had to cut his trip short, and return to Washington on the advice of physician. He is desk-bound at present, but very much on the job so far as his injuries will permit.

Frank L. Carter, who was treasurer of the Carter Motor Car Co., operating at Hyattsville, Md., from 1907-1911, died Nov. 2 in Miami, where he had made his home for several years.

Dubois Young, president of Hupp, was operated on for appendicitis recently. Pontiac, Mich., unemployment is expected to be reduced materially during the current month owing to plans of the Wilson foundry to take on old employees. The Oakland foundry is reported to open Nov. 9, the engine and sheet-metal plant, week of Nov. 16, and the assembly plant, week of Nov. 23.

On Nov. 3, 1911, the Chevrolet Motor Co. of Michigan was incorporated. A small workshop on Grand River Ave., Detroit, took care of the first year's operations, which consisted of four or five cars produced under the direction of Louis Chevrolet, who had made quite a name for himself on the race tracks. Chevrolet entered the volume production field in 1915, with the famous "490." The first year's production of "490's" was 70,000, in the main plant, which had been moved to Flint in 1913. More than 20,000,000 units have been produced by the company to date. The price of the "490" continued the lowest in the history of the company, until the 1931 series came out, when the base price was reduced to $475. There are the facts in a rather exciting yarn.

Next week, or shortly thereafter, there will be printed in the old columns, some swell pictures of truck production in Manchuria. We're not claiming its an important industry, but to be the smallest plant in the largest country ought to be some distinction.—H. H.

THE NEWS TRAILER

Mullins Reports Profit

NEW YORK, Oct 28—Mullins Mfg. Corp. reports net profit for the first nine months of the current year of $101,588. This is equivalent to $3.53 a share on preferred stock and compares with a loss of $31,240 for the corresponding period of 1930. Earnings for the third quarter were $17,349 or 60 cents a share, as compared with a loss of $25,428 for the corresponding period of last year.

Mayer Rejoins Budd

W. J. Mayer has joined the engineering department of the Edw. G. Budd Mfg. Co., Philadelphia. He formerly served with the Budd organization as assistant to Joseph Ledwinka, chief engineer.

Chevrolet Names Hill

R. W. Hill has been appointed zone manager for the Chevrolet Motor Car Co., succeeding G. I. Smith, who has gone to Detroit. Mr. Hill was zone manager at Jacksonville, Fla.

G. M. Declares

NEW YORK, Nov. 4—General Motors Corp. has declared the regular quarterly dividend of 75 cents a share on common stock, payable Dec. 12 to stockholders of record Nov. 14. Quarterly dividends of $1.25 a share on $5 preferred stock was also declared, payable Feb. 1, 1932, to stockholders of record Jan. 4

Nash Adds Accessories

CHICAGO, Nov. 3—Three new accessories have been added to the Nash Special equipment line. They are an automatic starting device, a rear tire guard and a radio receiving set.

Buick Out Nov. 14

DETROIT, Nov. 4—Announcement of the new 1932 line of models by Buick Motor Co. is scheduled for Nov. 14. The new line is to be featured by a mechanical development called the wizard control.

Men of the Industry and What They Are Doing

Willard Advances Rolph

S. W. Rolph has been elected vice-president and general manager of the Willard Storage Battery Co., Cleveland. His association with the company began as the owner of a Willard service station in Bellingham, Wash. In 1916 he became district representative of the company for southern California. Brought to Cleveland in 1918, he filled various executive positions in the home office of the company, and was made vice-president and assistant general manager in January, 1929.

Burgess is Recovering

Improvement continues to be shown in the condition of Dr. George K. Burgess, who is in Emergency Hospital, Washington, D. C., following a cerebral hemorrhage he suffered on Wednesday of last week while presiding over a meeting of division chiefs of the bureau. His illness prevented Dr. Burgess from making an address at the S.A.E. meeting. Unless there are developments now not apparent, it was stated that Dr. Burgess will make a comparatively early recovery, considering the seriousness of the attack he suffered.

Oostdyk Joins American

The appointment of Charles A. Oostdyk to the position of sales manager of the American Woolen Co.'s Detroit office has been announced by Lionel J. Noah, president of the company.

Mr. Oostdyk has been a well-known figure in the automotive industry for more than a quarter of a century, having served as general purchasing agent of Hudson Motor Car Co. for 11½ years. Earlier in his career he was connected with Cadillac Motor Car Co. and later became associated with General Motors Corp. as director of purchases. Following this, he sold automobile materials for many years.

With the opening of the office in Detroit recently, the American Woolen Co. is now engaged in selling flat fabrics direct to the motor car producers.

Dodge Makes Changes

A. vanDerZee, general sales manager of Dodge Brothers Corp., has announced the following changes in the field sales organization:

J. R. Lake has been appointed sales representative with headquarters in Detroit, succeeding H. M. Rowell, who has been transferred to the Chicago region.

A. A. French, formerly sales representative in the Green Bay zone, has been transferred to the Minneapolis zone to succeed L. W. Mann, resigned.

In the South Boston zone, C. A. Lemmon, who resigned to become associated with the Dodge dealership in Syracuse, has been succeeded by F. H. Marr, formerly of the North Boston zone. W. F. Maloney, formerly sales representative in the Binghamton zone, takes over Marr's duties in the North Boston zone.

Donaldson Recuperating

O. M. Donaldson, sales executive of the Electric Auto-Lite Co., Toledo, Ohio, is still confined to his apartment through an injury to his thigh received some time ago. Although Mr. Donaldson is rapidly recovering from his injury, it will be at least two weeks before he is able to again return to his duties at the Auto-Lite office.

Thompson Succeeds Heath

A. W. Thompson has been appointed to succeed W. C. Heath as vice-president of Fairbanks, Morse & Co., Beloit, Wis., in charge of all manufacturing. Mr. Heath resigned to become a member of the executive staff of the A. O. Smith Corp., Milwaukee, effective Nov. 1.

Baldwin Meeting Postponed

DETROIT, Nov. 2—The stockholders' meeting of Baldwin Rubber Co., scheduled for Oct. 29, has been postponed until Nov. 20. It is expected that at this meeting plans for the opening of a Canadian plant at Orillia, Ont., will be approved. Orillia is located approximately 60 miles north of Toronto on the Canadian National R. R.

Bucyrus Shows Profit

CHICAGO, Nov. 2 — Net profits of Bucyrus Monighan Co. for nine months ended Sept. 30 were $225,541, after all charges, including Federal taxes and depreciation, equal to $3.15 a Class A share and $2.48 on the Class B. This compares with $190,529, or $2.72 a Class A share, and $2.04 a Class B share in the 1930 period.

September quarter net was $104,503, equal to $1.42 Class A and $1.19 a Class B share against $70,470 in the preceding quarter, equal to 99 and 77 cents a share respectively, and $76,219, or $1.06 a Class A share and 84 cents a Class B share in the third 1930 quarter.

September 30 balance sheet shows current assets of $1,247,465 and current liabilities of $167,736 against $1,136,561 and $171,426 respectively at the close of the preceding quarter.

A. J. Banta

LOS ANGELES, Oct. 31 — A. J. Banta, one of the best known men in the automotive industry for many years, died here last night at his home in North Hollywood. Mr. and Mrs. Banta came here a few years ago to settle permanently.

"Jack" Banta, as he was known to thousands, was one of the pioneers in the industry. Years ago he was one of the leading dealers on motor row in Chicago handling well-known cars, among them the Locomobile. Later on he became identified with motor vehicle companies as a sales executive.

For some years he was directing the affairs of a truck company in Ohio, then became sales manager of the Rickenbacker Motor Car Co. at Detroit. From there he went to the General Motors Truck Co. He was a familiar figure at the Chicago automobile show many years, and would come from California to be present after he retired. He is survived by his wife, Charlotte Banta.

The body left Los Angeles today for Chicago where funeral services were to be held on Wednesday, with interment in Forest Home Cemetery in that city.

Federal Adds Six-Wheeler

DETROIT, Nov. 4—A new six-wheel, two-wheel drive, 4-ton truck has been announced by the Federal Motor Truck Co., extending that company's range of six-wheel vehicles into a higher tonnage classification. Of the two rear axles the rear unit furnishes the propulsion.

The truck has a gross rating of 18,500 lb. and is powered with a Continental 16c six-cylinder seven-bearing of 3⅜-in. bore by 4⅝-in. stroke and is priced at $2,360 and $2,385 for the 164 and 182-in. wheelbases in which this A6SW model is available.

The six-wheel unit used in the new 4-tonner is of the general Federal design described recently in *Automotive Industries* with the introduction of the 3-ton Federal six-wheelers. A point of difference, however, is that in the 4-ton truck, the central spring seat, where the two springs on each side are carried at the frame, is of a swiveling rather than fixed type. This change is made in order to increase the flexibility of the unit, allowing each side of the axles to move up and down vertically, permitting the axle unit to adjust itself to large road irregularities. The design also prevents the transmission of spring torque to the chassis frame, of course, decreasing frame, body and cab distortion.

Trunnion and spring pins in the six-wheel unit are exceptionally large, the factory states, and are automatically lubricated through the incorporation of the patented Federal Reservoil oil reservoir at the pins.

Du Pont Develops Synthetic Rubber

Base Materials for Its Production Are Acetylene, Salt

AKRON, Nov. 3—The discovery of a process for the manufacture of synthetic rubber was announced here this week at the American Chemical Society meeting by E. I. du Pont de Nemours & Co. The new product, which is known as Duprene, is the result of long research.

The primary raw material for the new synthetic rubber is acetylene, which requires only coal and limestone for its production, and the only other raw materials are salt and water.

Chemists reveal that the new synthetic rubber is made by the controlled polymerization of chloroprene, which is made by the catalytic polymerization of acetylene to mono-vinyl-acetylene. The latter is then treated with hydrogen chloride to produce chloroprene.

The new product can be vulcanized by the application of heat alone. Its X-ray diagram is similar to that of natural rubber, showing the same type of molecular structure, and an artificial latex can be made from it. The latex is a milk-like liquid consisting of particles of fully vulcanized synthetic rubber suspended in water.

Duprene is claimed to possess many commercially valuable qualities, in consequence of which it will supplement natural rubber in various applications, but it has not yet advanced to a point where it can be substituted for natural rubber in its wider ranges of everyday use. It is not now expected to displace the natural product for the manufacture of tires.

Those who have been active in the development of the new synthetic rubber declare they feel that further effort may greatly enlarge its field of usefulness, and so certain is the du Pont company of the merits of the discovery that it is constructing a plant at Deepwater Point, N. J., for its manufacture on a commercial scale.

Among other valuable properties of the new product set forth in announcements is the fact that it is much more resistant than natural rubber to gasoline, kerosene and other solvents that are notoriously harmful to rubber. It is also more resistant to oxygen, ozone and many chemicals that attack rubber.

New Speed Records (International)

Certified by the International Association of Recognized Automobile Clubs

At Montlhery. Oct. 10-11, 1931. Zehender, Benoist and Chinetti driving Alfa-Romeo, Class E. 1752 c.c. displacement. Standing start. 500 miles at 97.99 m.p.h. 1000 kil. at 97.11 m.p.h. 1000 miles at 97.40 m.p.h. Six hours at 96.85 m.p.h.

Traffic Managers Await Rail Decision Which May Bring Increased Shipping Cost

Automobile traffic managers who met recently in Detroit are now awaiting with interest the final disposition of the proposal of the Interstate Commerce Commission that railroads pool their earnings on certain increased freight rates that are to be allowed providing the added revenue is used to assist the weaker lines in meeting interest charges. If the plan is made effective, it will add 2 cents per 100 lb. on all shipments of automobiles, parts, steel and tires as well as certain other charges on specified commodities such as coal, lumber and pig iron, all of which are received in considerable quantities at automobile plants and will be subject to additional charges of from $3 to $6 per carload. Oil and gasoline would be charged an extra 1 cent per 100 lb. and all switching charges increased 10 per cent.

The meeting received reports on appearances made by the chamber and the special committee of traffic managers before the Interstate Commerce Commission at Detroit last week in the railroads' proposal to suspend rules which have always been applied on automobile shipments where cars longer than actually required were furnished by the railroads. The proposed rating would increase the minimum carload weight in such cases.

It was also reported that Southwestern and Western Trunk Line railroads have decided to extend the expiration date of the tariffs published several months ago providing special rates on automobile shipments for distances up to 500 miles in competition with motor truck haulage of new cars from the factories and assembling plants. These rates were originally published to expire in December. They have been in a measure successful and rail carriers have decided to continue the plan.

Considerable interest is being shown in an experimental car built by the Pennsylvania R.R., 70 ft. in length and designed to handle automobile shipments at lower cost. The car is equipped with loading devices that would eliminate blocking and decking expense and is now being demonstrated at automobile plants in this territory.

A number of the traffic managers also attended the hearing now being conducted in Detroit by Examiner Bardwell of the Interstate Commerce Commission which is inquiring into railroad practices in placing and switching cars at industries having side tracks. At the Detroit hearing, the examiner is taking testimony of Michigan railroads with respect to their services of this character at the plants of automobile manufacturers and other Michigan industries.

Factories represented at the N.A.C.C. traffic managers' meeting include Auburn, Buick, Cadillac, Checker Cab, Chevrolet, Chrysler, Dodge, Federal, General Motors, Graham-Paige, Hudson, Hupp, International Harvester, Lincoln, Oakland, Reo, Studebaker, White; K. A. Moore, N.A.C.C., and J. S. Marvin, chairman of the conference.

Ford Leads Wayne Sales

DETROIT, Nov. 4—Registrations of passenger cars in Wayne County during October totaled 1882, a decrease of 10 per cent from the total of 2094 for October, 1930, and a decrease of 32 per cent from the September figure of 2797. Total registrations to date this year number 42,269 against 58,632 for the same period last year.

Ford was first with 640, a decrease of 20 per cent from the September total of 807. Chevrolet was second with 367, which is an increase of 28 per cent over the total for October, 1930. Plymouth was third with 205, Essex fourth with 71, Chrysler fifth with 62 and Willys sixth with 53.

Commercial car registrations last month totaled 293 against 346 for September and 415 for October, last year. Ford was first with 173, Chevrolet second with 75 and G.M.C. and Dodge both third with 10 each.

Mengel Reports Loss

LOUISVILLE, Nov. 3—The Mengel Co., Louisville, of which the Mengel Body Co. is a part, in a financial statement for the third quarter and the first nine months, reports net sales for the third quarter of $1,370,636 and net loss, $167,612, after interest, expenses, etc. For nine months of this year the net loss is $162,215. Unfilled orders, Oct. 14, were $960,000, as against $1,416,000 on the same date of last year. The company has no banking indebtedness and reports ratio of current assets to current liabilities as 21 to 1, as of Sept. 30.

Reo Produces 1052 Units

DETROIT, Nov. 3—Reo Motor Car Co. has reported production of 1052 passenger cars during October, compared with 2365 during the same month last year.

Hupp Ships 507

DETROIT, Nov. 3—Hupp Motor Car Corp. reports shipments of 507 cars during October, against 784 in September this year.

Buick Produces 5012

DETROIT, Nov. 3—Buick Motor Co. has reported production during October of 5012 cars, compared with 11,171 in October last year.

Production Chart Down: Other News

I.H.C. Plants Resume

CHICAGO, Nov. 5—All the plants of the International Harvester Co. in U. S. and Canada resumed active operation Nov. 1, officials announced Wednesday. By the end of the week several hundred men will be back at work at wages ranging from 10 to 20 per cent under former rates. Seniority rights were observed in rehiring. Men are urged to make voluntary 2 per cent contribution to unemployment relief. The new schedule, in most plants increasing the week to four days, will affect approximately 20 plants.

Graham Sales Up, Stocks Down

DETROIT, Nov. 3 — Graham - Paige Motors Corp. has reported that retail sales during October are the largest of any month since June. Sales during October exceeded for the first time this year, the corresponding month of 1930, with a gain of 16 per cent. Stocks of cars in the hands of dealers are now 50 per cent lower than a year ago.

Ford Building Hydro Plant

DETROIT, Nov. 4 — Hydro-electric plant and dam and factory building are being constructed at Ypsilanti, Mich., on property purchased several years ago by Ford Motor Co. Plans call for employment of 400 men at the completion of the buildings, which, it is reported, will be for manufacture of upholstery textiles.

Trico Reports Loss

NEW YORK, Nov. 4—Trico Products Corp. reports net profit for the nine months ending Sept. 30 of $1,745,124. This is equivalent to $3.92 a share on common stock, and compares with earnings of $1,573,005, or $4.19 a share for the corresponding period a year ago.

Wilcox Reports Loss

DETROIT, Nov. 3 — Wilcox - Rich Corp. has reported for quarter ended Sept. 30 net loss of $18,315 after taxes, charges and preferred dividend requirements, compared with a deficit of $8,593 for the corresponding period last year.

Materials' Index Drops

NEW YORK, Nov. 4—The index of prices on automotive raw materials, compiled by Ray B. Prescott, especially for *Automotive Industries*, stood at 88 in the middle of October, a decline of two points from the September figure. In the middle of October, a year ago, the index stood at 100. The Bradstreet index of general raw materials' prices stood at 93 for October, 1931.

Willys Reports Loss

TOLEDO, Nov. 4—Net loss of Willys-Overland Co. for third quarter is $184,185, compared with $2,681,195 loss in same period last year, L. A. Miller, president, reports. Net profit for nine months is $120,462, compared with net loss of $2,429,493 for same period last year.

Adopts Lycoming Engines

WILLIAMSPORT, PA., Nov. 5—The H. W. de Voogt Boat Co. of Haarlem, Holland, has announced the adoption of Lycoming marine engines as regular equipment on its line of boats. The de Voogt Co. is one of the largest boat manufacturers in the Netherlands. The company has recently announced a 28-foot runabout powered with a Model UC 125 horsepower Lycoming motor, and a speed of 28 m.p.h.

New Models Expected

PHILADELPHIA, Nov. 5—A maker of high priced cars, it is learned from authoritative sources, is to announce 1932 models in about a week. It is understood that the cars will be priced materially lower and will combine such features as synchromesh freewheeling in all speeds, ride control and a box member frame.

Marlin-Rockwell Profits

NEW YORK, Nov. 5—Marlin - Rockwell nine months' profit amounted to $214,173 or 59 cents a share compared with $783,884 or $2.15 a share last year. The third quarter profit amounted to $10,102 or three cents a share as compared with $101,608 or 28 cents a share last year.

Holman Joins White Co.

Frank Holman, who was formerly connected with the engineering department of the Autocar Company, Ardmore, Pa., has joined the White Co., Cleveland, in a similar capacity.

Parker Declares Extra

DETROIT, Nov. 5—Parker Rustproof Co. has declared an extra 50 cent dividend on common stock in addition to the regular quarterly dividend of 75 cents. Also the regular semi-annual dividend of 35 cents on preferred. All are payable Nov. 20 to stockholders of record Nov. 10.

Diamond T Books Order

CHICAGO, Nov. 5—An order for 150 1½-ton trucks has been received by Diamond T Motor Car Co. from Dugan Brothers, Inc., purveyors of bakery goods, E. J. Bush, vice-president of the truck firm, announces.

Waterbury Elected Curtiss

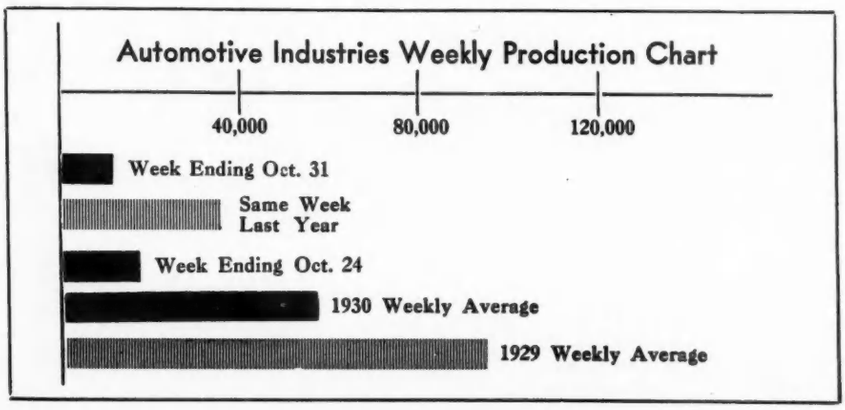
C. W. Curtiss, who was formerly connected with the Splitdorf Electrical Co., and the Tiffany Mfg. Co., has been elected president of the Waterbury Clock Co.

Belgian Ford Sales Up

NEW YORK, Nov. 5—Belgian Ford sales for nine months were 14 per cent above last year.

Correction

In our issue of Oct. 24 on page 662 it was stated that the fan used on the present Franklin engine takes 4.2 hp. at 300 r.p.m. This should have been 3000 r.p.m.



Canadian Financing Off

OTTAWA, Nov. 3—The figures for automobile financing show a decrease in September as compared with August of this year, and indicate a falling off in financing as compared with the corresponding month (September) in 1930. The per cent of change is 39.9.

The total number of cars financed was 5857 in September, 1931; 6808 in August, 1931, and 8292 in September, 1930; and the amount of financing was $2,568,484 in September, 1931; $2,906,507 in August, 1931, and $4,271,752 in September, 1930.

New cars financed were 1753 in September 1931; 2188 in August, 1931, and 3127 in September, 1930; while used cars financed were 4104 in September, 1931; 4620 in August, 1931, and 5165 in September, 1930.

Financing of new cars amounted to $1,225,949 in September, 1931; $1,418,134 in August, 1931, and $1,754,700 in September, 1930. Financing of used cars amounted to $1,342,535 in September, 1931; $1,488,373 in August, 1931, and $2,517,052 in September, 1930.

Cites Highway Burden

MONTREAL, Nov. 3—Canadian highways are nearly double the charge on the Canadian public than the railways, according to S. W. Fairweather, director of economics of the Canadian National Railways, who sounded a warning before members of the Electrical Club on the rapidly growing burden of highway extension and maintenance during a luncheon address in the Queen's Hotel today. Mr. Fairweather stated that it required some $530,000,000 yearly to maintain the railway service in the Dominion of Canada and some $900,000,000 for highways, a total cost to the Canadian public for transportation of nearly a billion and a half dollars.

There must be a stop some time in the increase of money spent for transportation, he declared. The public, the speaker contended, is being asked unfairly at the present time to bear the cost of the commercialization of highways. Motor vehicle revenue amounted yearly in Canada to some $43,000,000, while actually some $133,000,000 was required.

G. Roy Hill

MINNEAPOLIS, MINN., Nov. 2—The funeral took place today of G. Roy Hill, secretary of the Automobile Club of Minneapolis 20 years, secretary of the Minnesota State Automobile Association, secretary-treasurer of the Rotary Club, who had been ill several weeks. He was active in American Automobile Association work. Mr. Hill was 53. He is survived by his wife, mother, sister and three sons.

An Obvious Error

With no malicious intent, *Automotive Industries* for Oct. 31 carried a news item on page 696, with the following caption: "Great Lakes Gets Receiver." The story under the caption obviously did not refer to the Great Lakes Aircraft Corp., but the latter reports a number of inquiries concerning it and wishes it to be made clear that the Great Lakes Aircraft Corp. was not involved in any way in the receivership proceedings, which concerned only the Detroit Aircraft Corp., an entirely different organization. *Automotive Industries* regrets the occurrence of the obvious error, and extends its apologies to the Great Lakes Aircraft Corp.

N.S.P.A. Meeting to Precede Show

NEW YORK, Nov. 4 — National Standard Parts Association will hold its convention prior to the joint show, to be held in Atlantic City, Dec. 7 to 12. The convention will open on Dec. 4 and will run through the following day. The schedule of the convention includes three general sessions and one additional meeting each for jobbers and manufacturers. The convention will be held at the Ambassador Hotel.

Perfect Circle Sales Up

CHICAGO, Nov. 5—September Perfect Circle Piston Ring sales were 47 per cent better than September, 1930, according to a statement by Lothair Tettor, vice-president in charge of sales. The nine months total showed an increase of 23 per cent over the same period of 1930 and came within a few thousand dollars of equaling the nine months record made in 1929.

Replacement sales for the first nine months registered gain of 62 per cent over the same 1930 period. September replacement sales were 75 per cent ahead of September, 1930, making this month the largest of any September in the company's history. Sales in the export division gained 108 per cent for the first nine months over last year. Canadian sales gained 115 per cent in the nine months period over the first nine months of 930.

Watson is Honored

Charles S. Watson, advertising manager of the Goodyear Tire & Rubber Co. of Canada, Ltd., was recently elected Canadian representative on the board of governors of the Direct Mail Advertising Association, later confirmed as first vice-president at the late convention of this body held at Buffalo, N. Y.

September Sales Off 28.7 Per Cent

Polk Figures Show Favorable Middle Atlantic Returns

DETROIT, Nov. 3—New passenger car sales during September, according to R. L. Polk & Co., totaled 124,903 units, as compared with 175,286 units in September, 1930, and with 155,744 units in August, 1931—a decline of 28.7 per cent from the total of the same period last year and of 19.8 per cent from the August, 1931, figure.

September's sale brought the total for the three quarters of 1931 to 1,652,089, approximately 27.8 per cent under the total sales during the same nine months' period last year. Inasmuch as the fourth quarter of 1930 yielded a total of only 339,339 units, it is indicated that sales for the entire year 1931 will fall short of the 2,086,000 units estimated as likely several months ago.

The distribution of passenger car sales in the several zones of the country during the first three quarters of 1931, displays a tendency of decided regularity, each zone holding its relative position with only minor changes, as shown in the following table:

	First Quarter	Second Quarter	Third Quarter
New England	6.69	10.14	8.73
Mid-Atlantic	21.60	25.46	25.47
East North Central.	22.86	23.34	21.47
West North Central	14.06	11.12	10.80
South Atlantic	10.60	10.01	11.43
East South Central	3.51	3.78	4.04
West South Central	7.07	5.68	6.26
Mountain	3.19	2.74	2.71
Pacific	10.42	7.73	9.09

The same regularity is disclosed in a regional analysis of commercial car sales totals.

According to some authorities, an upturn in business conditions will be heralded by an increase in the percentage of the Middle Atlantic States. If this is sound, the change from 21.6 per cent to 25.46 and 25.47 per cent is at least not discouraging.

During the three quarters, sales of new passenger cars were divided between the three price-class groups as follows:

	First Quarter	Second Quarter	Third Quarter
Low	73.3	74.1	74.6
Medium	24.1	23.7	23.0
High	2.6	2.2	2.4

Complete reports compiled by the Polk company show sales of new commercial cars aggregating 25,967 units in September, 1931, as compared with 33,933 units during the same month in 1930, and with 27,070 units during August, 1931. The declines shown are 23.5 per cent and 4.1 per cent respectively.

Total commercial car sales during the three quarters of the year were 260,469 units, as against 335,785 units during the same nine months in 1930, a decline of 75,316 units, or 22.4 per cent.

Connecticut Issues List of Approved Free Wheeling Installations on Cars

HARTFORD, CONN., Nov. 2—In the 1931-1932 edition of the "Manual for Motorists" of the Department of Motor Vehicles of the State of Connecticut, the cars named below, which carry factory-installed free-wheeling devices, are eligible for licensing in the state. Other cars not on the improved list must be approved individually before a license can be issued. The approved list follows:

Auburn 8-98
Chrysler Six
De Soto Six
De Soto 8
Dodge Bros. 6
Dodge Bros. 8
Duesenberg J
Essex Super 6
Graham Bros. 6
Graham Std. 6
Graham Spec. 6
Graham Spec. 8-20
Graham 8-34
Hudson Great 8
Hupmobile S-2
Hupmobile L
Hupmobile C
Hupmobile H.U.
Lincoln 8
Marmon 70
Marmon 88
Nash 960
Nash 970
Nash 980
Nash 990
Peerless Custom 8
Pierce-Arrow 43
Pierce-Arrow 41-42
Plymouth
Studebaker Six
Studebaker Dic. 8
Studebaker Com. 70
Studebaker Pres.
Willys-Knight 66D
Willys Six 97
Willys Eight 8-80D
Willys-Knight 95
Willys Six 98D

To Assemble Rover Cars in Australia

LONDON, Oct. 21 (*by mail*)—As the result of negotiations completed between the Rover Company, of Coventry, and Williams, Hill and Cameron, of Sydney, Rover cars are to be assembled locally in Australia. Under the new arrangement the main units of Rover cars will be shipped to Australia, where they will be combined with other units manufactured in Australia.

W. H. Cameron, managing director of the Sydney firm, who arranged the deal with Colonel Frank Searle, managing director of the Rover Company, says he is convinced that Australia is now on the upgrade and that in the very near future there will be a move to reduce the tariffs in favor of British products.

Develops New Trailer

MILWAUKEE, Nov. 2—The Stoughton Co., Stoughton, Wis., is bringing out a new trailer to be known as the Stoughton Cushioned Fifth-Wheel Trailer. There is no metal-to-metal contact and all shocks and jars ordinarily transmitted to the mechanism of the hauling unit are said to be absorbed by live rubber cushions.

Get Dardelet Licenses

NEW YORK, Nov. 3—The Automatic Products Co. and National Machine Products Co., both of Detroit, have been licensed by the Dardelet Threadlock Corp. to manufacture bolts and nuts, cap screws, set screws and studs threaded with the Dardelet self-locking screw thread.

Carl A. Johnson

Carl A. Johnson, president, Gisholt Machine Co., Madison, Wis., manufacturer of turret lathes, balancing machines and other tools, died suddenly from a heart attack on Oct. 30, shortly after returning home from the governor's unemployment conference at the state capitol in Madison. Mr. Johnson was a native of Madison, and a graduate of the college of engineering of the University of Wisconsin. He was widely recognized in his profession and only recently completed two terms as president of the National Machine Tool Builders Association. He was president of the Wisconsin Manufacturers Association in 1920 and a director in several banks, insurance companies and other industries. He was 60 years old.

Body Activity to Meet

DETROIT, Nov. 2—Nov. 9 has been set as the date for the first meeting of the body activity division of the Detroit Section, S.A.E. Speakers on the program are William L. Hoge, vice-president of the Mengel Company, Louisville, Ky., who will talk on "Wood in Automobile Bodies"; R. O. Griffis, associate director of research of the American Rolling Mill Company, Middletown, Ohio, who will discuss "Automobile Body Steel Sheets," and Howard Ketcham, director of the Duco Color Advisory Service of E. I. duPont de Nemours and Company, with a talk on "European Sources of Automotive Color Inspiration."

Ainsworth Reports Profit

CHICAGO, Nov. 2—Ainsworth Mfg. Co. reports consolidated net income of $4,152 for the nine months ended Sept. 30, 1931, after all charges, compared with $326,524 last year. For the September quarter there was a consolidated net loss of $3,129 after charges, compared with $42,514 profit or 26 cents a share on 164,546 $10 common and a loss of $9,664 in the third 1930 quarter.

Nachman Directors Reelected

CHICAGO, Nov. 2—Directors of Nachman - Springfilled Corporation were elected again at the annual meeting of stockholders. At a subsequent meeting of directors, retiring officers were reelected.

Steel Purchases Pick Up Further

Automotive Buying Gains Momentum With Some "Shipping"

NEW YORK, Nov. 5—Automotive buying of sheets, strip steel, cold-finished steel bars, bolts and nuts and other wire products gained further momentum this week. The pick-up is not uniformly distributed over all of the steel-producing districts, but moderate gains are becoming more and more general. Many heretofore idle units are resuming rolling and the low point in employment and operations seems to have been safely left behind.

With demand from many of the steel-consuming industries backward, automotive buying is again taking the lead, as it has so often done in the past, in quickening activities in the steel industry. While one occasionally hears reports of this or that purchasing agent indulging in considerable "shopping" before placing round-tonnage business, pressure on prices results chiefly from competition among sellers.

Strip steel is definitely quotable at 2.05@2.15 cents, Pittsburgh, for the cold-rolled, and at 1.50@1.65 cents for the hot-rolled, the market being rather easy at these lower levels. While there have been rumors of occasional concessions on desirable specifications for full-finished automobile sheets, the market is fairly steady at 3.10 cents, Pittsburgh, as the quotable basis for the general run of business. Ordinary black and blue annealed sheets are unchanged. The market for automotive alloy steels is of a routine character, with the demand rather light, but prices steadily maintained.

Pig Iron—Automotive foundries are melting more iron, but buying is chiefly in 100-ton lots. Lake furnaces quote $16 for No. 2 foundry, that being also the valley price.

Aluminum—The market is marking time with no change in prices noted either in the primary or secondary markets.

Copper—Dull and unchanged at 7 cents, delivered Connecticut Valley, and 7⅛ cents, delivered Middle West.

Tin—Under the influence of a sharp drop in pound sterling exchange, the market for Straits tin declined to 22.20 cents at the week's opening.

Lead—The leading interest reduced its official contract price $3 per ton on Monday, bringing the price down to 3.85 cents, New York.

Zinc—Firm and quiet.

Develops New Instrument

NEW YORK, Nov. 2—Pioneer Instrument Co. has developed a new compass known as the telepoint, a remote reading magnetic compass for use primarily in airplanes. The magnetic director is of the aperiodic type and its sensitivity can be controlled from the dashboard. There are no rotating parts, with the result that there will be practically no service or adjustment required after installation.

The Swope Plan

(Continued from page 710)

more to curb unbridled competition, which undoubtedly plays a large part in bringing on depressions."

Mr. Hook, in the paper mentioned, goes on to amplify his ideas in considerable practical detail, but the foregoing is indicative of the general character of this particular executive's thoughts on this important subject.

Contacts with automotive executives concerning the Swope plan revealed one other fact—and a natural one—namely, that the plan has had only cursory reading by many men in the industry with the natural result that some tendency exists to misinterpret both the implications and the factual content of Mr. Swope's program.

Strong evidence of very careful study, on the other hand, is just as clear in other cases. It is equally clear than a great many automotive executives are thinking and talking among themselves and their coworkers about the problems so well clarified by Mr. Swope; and that, in addition to active planning for participation in the movements to alleviate unemployment this winter, much sincere automotive thought is being given to the broader and more permanent implications of the current unemployment crisis.

Testing License Plates Made of Zinc

It is reported that the state of New Jersey, within whose borders the Franklin mine of the New Jersey Zinc Company is located, has under way a comprehensive series of tests on automobile license plates made of zinc. This same subject already has been given consideration by Missouri, Kansas and Oklahoma. Adoption of zinc plates by these three states would result in the consumption of about one-thousand tons of metal per year, which would mean two thousand tons of zinc concentrate from the Joplin field.

Kissel Sale Postponed

HARTFORD, WIS., Nov. 2—The receiver's sales of the properties of the Kissel Motor Car Co., originally scheduled to be held Oct. 27, has been postponed to Nov. 23, it was announced by George A. Kissel, president of the company, and now co-receiver.

Gramm Adds Trailers

CHICAGO, Nov. 3—Gramm Motors, Inc., Delphos, Ohio, announces a line of semi-trailer units, with a nominal rating of from three to 18 tons, embodying a number of interesting features in design and construction.

Federal Reserve Board Appears Lukewarm On Discounting Finance Company Paper

WASHINGTON, Nov. 2—The Federal Reserve Board has not indicated when it may act on the recommendation that it admit instalment finance corporation notes to eligibility for rediscount. It is the prevailing view that the board will not do anything for several weeks. If it approves the proposal the board will make announcement of modification of the eligibility provision. But if it disapproves, its action will be negative and no formal announcement will be made.

Once previously the board disapproved the plan. Its present position appears to be somewhat more favorable, yet as a whole the board is said to be lukewarm. Also, it is reported that there is definite opposition on the part of some advisers of the board.

The remarkable growth of automotive finance corporations with the high character of automobile and other paper as shown by recovery on account has, however, given it a strong standing in the general estimation of financial interests. They vigorously combat the contention that the paper is not self-liquidating. Returns made are held to amply support the claim that it is a commercial paper, as required by the Federal Reserve act in order to be subject to rediscount. Fundamentally, the soundness of the paper rests on wages. Wages of course are lower, under existing conditions, but, nevertheless, in the aggregate, they are steady and sure and the paper is based on this class of wages, and it is argued therefore that the paper in question represents actual capital credit and not simply "consumptive paper," as opponents to the rediscount plan argue.

Release of this grade of paper through rediscount, it is maintained, would be a vital force in stimulating industrial and employment activities. It has been pointed out that it would thaw assets as certainly and as safely as is being done under the sound plan of the $500,000,000 National Credit Corporation pool.

Supporters of the plan contend that the board has it within its own power to admit the paper to eligibility for rediscount and that therefore legislation is not required. However, if the board does not adopt the recommendation, supporters of the plan propose to ask for liberalizing of the Federal Reserve act so as to make the paper eligible for rediscount. President Hoover in announcing plans for the National Credit Corporation said he proposed to ask that eligibility provisions be broadened in order to permit paper not now accepted to be made subject to rediscount. The purpose is to widen the credit structure on a sound basis.

However, there is unquestionably a strong sentiment in Congress against opening up the Federal Reserve act for this purpose. Senator Carter Glass, ranking Democratic member of the Committee on Finance, has attacked suggestions for liberalizing the eligibility provisions. He charges that attempts are being made to dump frozen paper on the government. If President Hoover does proceed with his recommendation it is certain he will ask that safeguards be thrown up to avoid any possibility of Senator Glass complaining about it. The president is receiving many arguments for and against liberalization of the eligibility provision, and some of them are said to reflect growing sentiment in favor of rediscounting instalment finance company notes. But as the situation now exists it is speculative as to what may be done in this direction, either through the initiative of the board or through legislation.

Sulphur Content of Gasoline Studied

As virtually all specifications for gasoline limit the amount of sulphur allowed in the fuel, it is highly important to have an accurate method for obtaining reproducible results in determinations of the sulphur content of gasoline, says the United States Bureau of Mines, Department of Commerce, following an extensive study of the problem. The lamp method proposed by Graham Edgar and George Calingaert, combines several features which make it the most desirable of the methods that so far have been proposed for the routine determination of the total sulphur content of gasoline, the Bureau states in Technical Paper 513, by Ralph H. Espach and O. C. Blade, just published. A special highly sensitive indicator is suggested by Espach and Blade as a modification of the original Edgar and Calingaert method.

Copies of Bureau of Mines Technical Paper 513, "Studies on Determination of Sulphur in Gasoline," can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a cost of five cents.

Wisconsin Tax Upheld

MILWAUKEE, Nov. 2—The right of the state of Wisconsin to assess income taxes against holding companies whose subsidiaries do a large volume of annual business for a nominal annual fee has been upheld by the United States Supreme Court by its refusal to review the appeal of the Buick Motor Co. from the decision of the United States District Court in Milwaukee and the United States Court of Appeals.

Foundries Improve Own Equipment Faster Than Suppliers, Says Lenz

"Permanent mold production of all automobile castings, including cylinder blocks, will not happen until a mold is developed that has a fusing point as high above the fusing point of cast iron as the fusing point of cast iron is above aluminum, and in addition that the material will be non-chilling," Arnold Lenz, plant manager, Chevrolet foundry, stated at the recent student activities meeting of the Detroit Section, Society of Automotive Engineers.

"Even after this has been accomplished," Mr. Lenz continued, "its use will be limited. Ten or 12 years ago a well-known manufacturer predicted that in five years all of his castings would be made that way. I was told that he set aside $3,000,000 for development work. This manufacturer's prediction has not been realized, and there has been very little progress since the first year of the experiment. In the meantime, the modern sand foundry has increased production from 200 to 400 per cent, and millions have been spent for more complicated foundry equipment than the permanent mold machine."

Mr. Lenz, who was discussing the fundamentals of foundry practice, also made an interesting statement with respect to the development of foundry equipment. "Aside from knowing all the tricks of making cores and molds," Mr. Lenz said, "the foundry must be organized to improve its own equipment, because the foundry equipment builders are not developing their equipment in anticipation of new demands to the same extent the machine tool builders anticipate the needs of the machine shop."

The next student meeting of the Detroit Section, S.A.E., is scheduled for around Nov. 25. Speakers who are scheduled for the program include L. Clayton Hill, president, Dietrich, Inc., and Alanson P. Brush, who is president of the Brush Engineering Association.

M.E.A. Convention to Last Through Show

NEW YORK, Nov. 4—The Motor and Equipment Association convention, to be held in conjunction with the show in Atlantic City, N. J., will extend throughout the show. The program of the convention will, as a matter of fact, start before the show proper on Dec. 5 and will close on the final day of the show, Dec. 12. The program will include meetings of the existing M.E.A. together with sessions of the Motor and Equipment Manufacturers Association and Motor and Equipment Wholesalers' Association. Complete details as to speakers and other features of the convention are not yet available.

Mack Reports Loss

NEW YORK, Nov. 4—Mack Trucks, Inc., report net loss for the nine months ended Sept. 30 of $258,765. This compares with a profit of $2,384,875, or $3.09, for the corresponding period last year. Loss for the third quarter was $207,439, as compared with profit of $484,242, or 62 cents a share for the corresponding period last year.

Libbey Reports Loss

TOLEDO, Nov. 4 — Libbey-Owens-Ford Glass Co. reports net loss of $342,411 for third quarter, making total loss for nine months $514,503. John D. Biggers, president, said the automobile industry is emerging from slump and improvement in demand for plate and safety glass is insured during last two months of this year. Total manufacturing profit for nine months was $2,518,683 against which depreciation of $1,912,580 was charged. Other income added $262,361 for total income $868,464. General expenses, interest and discount on notes totaled $1,382,967. Company reports $7,560,545 current assets against $698,266 current liabilities. In addition to $2,233,221 in cash and bonds, the company reported $415,491 in closed banks and more than $3,600,000 invested in affiliated and controlled companies.

Ford Changes Plant Motors

DETROIT, Nov. 4 — A complete changeover of electric motors in the Rouge plant of the Ford Motor Co., which, at present, is only about 45 per cent completed, is estimated to require an additional year for completion. The changeover already represents an expenditure of $6,000,000. The move is part of the company's program of expansion in view of future needs, and benefits from the change will include reduction in motor control costs, greater safety to workmen, and ability to easily expand production facilities. A similar changeover at the Detroit plant of Lincoln Motor will result in expenditure of approximately $600,000.

M.E.A. Plans Banquet

NEW YORK, Nov. 4—The Motor and Equipment Association will hold its annual show banquet on Wednesday evening, Jan. 3. This will be in conjunction with the New York National Automobile Show, and will be in the grand ballroom of the Hotel Astor.

Quick Reading

After six and one-half months of continuous activity, an air circus, led by Capt. C. B. Barnard, has completed a tour of Great Britain. The circus, in which an average of six planes of different makes were engaged, was in action for 180 days and visited 118 towns. During the course of the tour, 160,000 miles were flown and 60,000 passengers were shown the advantages and safety of civil aviation. A British autogiro made part of the tour.

C. I. Montenyohl, treasurer of the B. F. Goodrich Rubber Co. and executive head of the International B. F. Goodrich Corp., recently returned from a two months' trip abroad with the belief that England is to become one of the most powerful international factors in bringing to pass the return of normal, economical business conditions throughout the world.

Verne L. Murray has been named Louisville zone manager for the Chevrolet Motor Co., succeeding Weston Hutter, who was recently sent to the Cleveland zone as manager. Mr. Murray was formerly assistant at Louisville.

General Motors Truck Co., Pontiac, Mich., recently shipped to the Palace Holding Co., which operates Palace cabs in New York, the first hundred taxicabs of an order for 150 units. The new cabs are Model O-12, just brought out by the General Motors Truck Co. The body design, upholstery and finish follow modern trend in passenger-car design.

Detroit Electric Car Co. is in active production on its Model 99, which closely resembles the conventional gasoline passenger car. The company is now making two models and, according to A. O. Dunk, president, there is still an active demand for the electrically driven vehicle.

The Nystrom Auto Lens Co., Inc., recently organized in Ada, Ohio, has named M. H. Smith, formerly of the Corcoran-Brown Lamp Co., office manager. R. Runyan is president of Nystrom, and J. M. Mead is advertising manager. The lens being manufactured by the company in a plant at Dunkirk, Ind., is an invention of G. H. Nystrom.

Arthur Willison, Milwaukee race driver, was killed Oct. 26 when his car overturned on the South Milwaukee Speedway.

The annual traffic census, recently completed by the Automobile Association of England, indicates a drop in traffic passing census points for the first time since the World War. In all, 2,645,881 vehicles passed the census point during the test week, a drop of 123,603 compared with 1930. Similar decreases are indicated by Ministry of Transport returns.

Denmark has increased its excise tax on gasoline from 0.07 to 0.09 crown per liter, according to the Department of Commerce.

Young Radiator Co., Racine, Wis., during September and October used day and night working shifts in their sheet metal stamping and assembly departments.

Adrian Beers, The Hague, was a recent visitor at the plant of the Diamond-T Motor Car Co. He reported an increasing call in his country for vehicles of heavy-duty capacity. To meet this demand, 107 different makes of motor vehicles are today being sold in Holland, he said.

In August, 1930, the Chrysler dealer organization numbered approximately 2800, according to J. W. Frazer. At the present time it consists of more than 3300 dealers or an actual increase of 500, Mr. Frazer has stated.

A committee appointed to receive the deposits of the capital stock of the Foote Bros. Gear & Machine Co., Chicago, for the consummation of a merger with the Dodge Mfg. Corp., resolved that it was not to the interest of the stockholders of Foote Bros. to proceed with the merger, and voted unanimously to abandon the same, according to a letter from J. F. Griswold, president of Foote Bros., to the stockholders.

Arkansas Highway Commission has promulgated a new order, effective from Oct. 28, limiting truck and trailer loads to 10,000 lb. and extending tolls at state-owned bridges to include passengers and pedestrians five cents each, drivers excepted, on automobiles, buses and trucks.

Airplane Sales Halved in August

Military Units Still Furnish Bulk of Complete Demand

NEW YORK, Nov. 2—Sales of commercial and military aircraft and engines during August attained a value of $2,578,821, according to the Aeronautical Chamber of Commerce of America, Inc. This brings a total for the first eight months of the year up to $25,458,314. In numbers there were 123 commercial planes, 36 military planes and 122 military engines delivered during the month. This compares with 263 commercial planes, 62 military planes, 201 commercial engines and 227 military engines sold the corresponding month of the previous year.

Military requirements continue to provide two-thirds of the income of the industry, although they have shown a gradual decline in volume since the beginning of the year. August deliveries of military equipment reached the lowest point in the last two years.

Franklin Improves Cooling

NEW YORK, Nov. 2—Franklin Automobile Co. has conducted a series of exhaustive tests on cooling of engines, as a result of which it has developed its temperature control system so that engines will not vary in operating temperatures more than 20 deg. Fahr.

Tests were made of individual engines selected at random, on each of which 32 thermocouples were laid, as a result of which it was demonstrated that with the new Franklin side-flow cooling system, every part of the engine exposed to operating heat was brought within this 20 deg. variation.

Reo Truck Sales Gain

DETROIT, Nov. 2—Total retail deliveries of new Reo trucks and buses during September in 45 states, representing 93 per cent of the United States market for commercial vehicles, according to the official registration figures now available, recorded a gain of 58 per cent over September last year, while the total for the same states for the industry as a whole, showed a loss of 23 per cent.

Offers New Insulating Mats

PONTIAC, MICH., Nov. 2—A line of wool-faced rubber mats has been added to the products offered by the Baldwin Rubber Co. to the original equipment and replacement market. Designed to provide better appearance and greater heat and noise insulating qualities, these mats have the wool facing cured on to the rubber, the wool being waterproofed. A number of different styles of finish are available.

August Gasoline Consumption Rose 5.4 Per Cent in 46 States, from '30

NEW YORK, Nov. 2—Gasoline consumption in 46 states and the District of Columbia for the month of August, 1931, as indicated by reports made by wholesalers and dealers in the various states under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,423,243,000 gallons, compared with 1,350,682,000 gallons in August, 1930, an increase of 72,561,000 gallons, or 5.4 per cent. Daily average consumption for August, 1931, was 45,911,000 gallons compared with a daily average of 46,099,000 gallons in July, 1931, a decrease in daily average during August of 0.4 per cent.

Gasoline consumption in these 46 states and the District of Columbia for the eight months ending with August, 1931, amounted to 9,322,721,000 gallons, compared with 8,947,788,000 gallons for the corresponding period of 1930, an increase of 374,933,000 gallons, or 4.2 per cent.

Consumption during May, June, July and August for the state of Pennsylvania is also shown.

GASOLINE CONSUMPTION BY STATES, AUGUST, 1931

	Tax per Gallon Cents	Month of July, 1931 Gallons	Month of Aug., 1931 Gallons	Month of Aug., 1930 Gallons	8 Months Ending With Aug., 1931 Gallons	8 Months Ending With Aug., 1930 Gallons
Alabama	5	15,403,000	14,608,000	15,717,000	110,017,000	116,528,000
Arizona	5	6,536,000	6,157,000	6,192,000	50,290,000	50,823,000
Arkansas	6	13,209,000	11,369,000	12,552,000	84,069,000	92,851,000
Colorado	4	20,660,000	18,819,000	18,360,000	123,619,000	115,951,000
Connecticut	2	21,870,000	24,650,000	22,997,000	144,993,000	147,507,000
Delaware	3	3,929,000	3,859,000	4,466,000	25,045,000	23,088,000
Dist. of Columbia	2	8,581,000	8,390,000	7,155,000	61,054,000	52,974,000
Florida	*7	19,632,000	15,780,000	16,599,000	158,167,000	144,015,000
Georgia	6	20,556,000	21,037,000	21,188,000	147,684,000	149,321,000
Idaho	5	6,325,000	6,841,000	7,222,000	39,885,000	40,108,000
Illinois	3	102,366,000	102,187,000	98,236,000	671,850,000	640,394,000
Indiana	4	49,414,000	48,492,000	43,825,000	322,676,000	303,606,000
Iowa	3	44,030,000	43,374,000	37,614,000	285,636,000	259,681,000
Kansas	3	51,201,000	49,330,000	36,663,000	291,479,000	268,190,000
Kentucky	5	17,253,000	17,321,000	16,588,000	115,556,000	110,633,000
Louisiana	5	16,664,000	17,291,000	16,083,000	123,065,000	121,484,000
Maine	4	14,866,000	15,783,000	15,151,000	74,825,000	69,191,000
Maryland	4	17,674,000	18,125,000	17,971,000	123,013,000	119,533,000
Massachusetts	3	59,770,000	60,805,000	55,722,000	372,959,000	351,859,000
Michigan	3	83,551,000	85,079,000	79,736,000	537,480,000	527,981,000
Minnesota	3	50,307,000	49,809,000	43,132,000	300,825,000	263,749,000
Mississippi	5	†12,322,000	†11,686,000	12,560,000	†88,011,000	89,816,000
Missouri	2	‡50,280,000	48,488,000	40,346,000	319,478,000	289,782,000
Montana	5	8,140,000	8,447,000	8,436,000	54,075,000	49,067,000
Nebraska	4	23,995,000	24,787,000	21,754,000	158,888,000	152,952,000
Nevada	4	2,460,000	2,529,000	1,976,000	15,774,000	12,328,000
New Hampshire	4	8,700,000	9,089,000	8,843,000	44,421,000	42,725,000
New Jersey	3	‡59,604,000	56,444,000	55,645,000	379,913,000	360,448,000
New Mexico	5	5,551,000	5,285,000	5,441,000	35,664,000	35,749,000
New York	2	‡169,277,000	169,019,000	157,629,000	1,066,467,000	998,515,000
North Carolina	6	22,303,000	21,185,000	20,469,000	153,753,000	160,975,000
North Dakota	3	13,247,000	14,650,000	17,399,000	83,172,000	83,760,000
Ohio	4	99,113,000	98,874,000	97,693,000	660,701,000	658,781,000
Oklahoma	5	28,458,000	27,353,000	29,446,000	205,544,000	215,206,000
Oregon	4	16,699,000	17,661,000	17,734,000	119,828,000	114,531,000
Rhode Island	2	10,435,000	10,674,000	9,247,000	65,255,000	57,941,000
South Carolina	6	10,911,000	11,169,000	10,976,000	80,149,000	77,821,000
South Dakota	4	15,418,000	12,674,000	15,710,000	96,384,000	95,338,000
Tennessee	6	18,132,000	19,853,000	21,111,000	137,914,000	140,990,000
Texas	4	80,127,000	80,555,000	74,055,000	554,836,000	534,654,000
Utah	4	7,290,000	5,825,000	5,895,000	41,890,000	41,214,000
Vermont	4	6,027,000	6,519,000	6,355,000	31,336,000	30,009,000
Virginia	5	23,690,000	24,245,000	22,887,000	157,069,000	148,971,000
Washington	5	24,449,000	27,270,000	27,599,000	186,138,000	182,345,000
West Virginia	4	14,916,000	14,947,000	14,620,000	91,215,000	90,424,000
Wisconsin	4	48,914,000	50,145,000	49,359,000	303,437,000	289,310,000
Wyoming	4	4,829,000	4,764,000	4,328,000	27,222,000	24,669,000
Total		1,429,084,000	1,423,243,000	1,350,682,000	9,322,721,000	8,947,788,000
Daily Average		46,099,000	45,911,000	43,570,000	38,365,000	36,822,000
Increase over previous year:						
Amount of Increase		.....	72,561,000	.....	374,933,000	.....
Percentage Increase in Daily Average		.....	5.4%	.....	4.2%	.....
			May	June	July	August
Pennsylvania	3		§96,022,000	96,580,000	103,283,000	104,435,000

*Became 7 cents Aug. 31, 1931. †Estimated. ‡Revised.
§Effective June 1, 1931, the Refiner ond Jobber collects the tax for all sales made for resale in Pennsylvania, instead of the state collecting the tax direct from the retailer.

Device Prevents "Frosting"

WILMINGTON, DEL., Nov. 2—A shield, designed to prevent the accumulation of frost on the windshields of automobiles, is described in the current issue of the *Du Pont Magazine*. It consists of a piece of transparent Pyralin sheeting cemented and riveted to a narrow steel frame, on the back of which is a strip of felt that fits against the glass when the shield is in place.

The function of the shield is to inclose a dead air space, thus preventing the warm, moist air in the car from coming in contact with the cold glass. It is claimed that the area protected is always clear. The shield is manufactured by the Peerless Novelty Co. of Grand Haven, Mich.

Overseas Club Plans Dinner

NEW YORK, Nov. 2—The Overseas Automotive Club will hold its annual dinner in conjunction with the M.E.A.-N.S.P.A. show in Atlantic City on the evening of Dec. 9.

Soviet Union Notes

From the "Economic Review of the Soviet Union"

The Soviet automobile manufacturing plant at Nizhni Novgorod was completed on Nov. 1 and will start in production by the first of 1932. This plant was started on May 1, 1930, and will have a capacity of 140,000 units of the Ford type. Of this capacity, 94,000 will be one and a half ton trucks.

The plant will employ about 15,000 persons and has six assembly lines, each a third of a mile long, the longest assembly line of any plant in Europe. The plant was built with the technical assistance of the Ford Motor Co., Albert Kahn, Inc., and the Austin Co., and has a contract with Ford for the purchase of $30,000,000 worth of parts.

About 200 American skilled workers recently left this country to work in this new plant.

* * *

U.S.S.R. is now erecting in Ufa, in the Bashkirsk republic, a new plant for the constructions of motors for automobiles and tractors. This plant, which will be one of the largest motor plants in the world, will have a capacity of 100,000 units per year upon completion, after which the capacity will probably be doubled.

* * *

U.S.S.R. has completed the reconstruction of the Amo truck factory, the only automobile factory in pre-revolutionary Russia. This factory will build one and a half ton trucks modeled along the lines of the Italian Fiat.

United Air Reports Profit

NEW YORK, Nov. 2—United Aircraft & Transport, Inc., and subsidiaries report net profit for the nine months ended Sept. 30 of $2,390,672. This is equivalent, after charges and taxes, to 89 cents a share and compares with earnings of $3,252,145, or $1.30 a share earned during the first nine months of last year.

Earnings for the third quarter were $742,568, or 27 cents a share, as compared with earnings of $1,149,164, or 46 cents a share, in the corresponding period of the previous year.

AC Has 1000 Outlets

DETROIT, Nov. 2—More than 1000 AC service stations, all of them equipped with special tools for servicing AC products, are now in operation in the United States, Canada and abroad, according to W. S. Isherwood, sales manager of AC Spark Plug Co.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Olympia Truck Show, London	Nov. 5-14
Passenger Car Show, Glasgow	Nov. 13-21
Salon, New York City	Nov. 29-Dec. 5
Motorcycle Show, London	Nov. 30-Dec. 5
National Automobile, New York	Jan. 9-16
San Francisco, Automobile	Jan. 9-16
Newark, N. J., Automobile	Jan. 16-23
Cincinnati, Automobile	Jan. 17-23
Milwaukee, Wis., Automobile	Jan. 17-23
Philadelphia, Automobile	Jan. 18-23
Louisville, Ky., Automobile	Jan. 18-23
Omaha, Neb., Automobile	Jan. 18-23
Boston, Mass., Automobile	Jan. 23-30
Minneapolis, Minn., Automobile	Jan. 23-30
Hartford, Conn., Automobile	Jan. 23-30
Detroit, Automobile	Jan. 23-30
Montreal, Automobile	Jan. 23-30
Baltimore, Automobile	Jan. 23-30
Pittsburgh, Pa., Automobile	Jan. 23-30
St. Petersburg, Fla., Automobile,	Jan. 27-29
National Automobile, Chicago,	Jan. 30-Feb. 6
Salon, Chicago	Jan. 30-Feb. 6
Washington, D. C., Automobile	Jan. 30-Feb. 6
Cleveland, Automobile	Jan. 30-Feb. 6
Springfield, Ill., Automobile	Feb. 4-6
St. Paul, Automobile	Feb. 6-13
St. Louis, Automobile	Feb. 7-12
Denver, Colo., Automobile	Feb. 8-13
Peoria, Ill., Automobile	Feb. 9-14
Salon, Los Angeles, Calif.	Feb. 13-20
Kansas City, Automobile	Feb. 13-20
Mankato, Minn., Automobile	Feb. 17-20
Holyoke, Mass., Automobile	Feb. 18-22
Des Moines, Iowa, Automobile	Feb. 21-26
Wichita, Kans., Tractor and Power Equipment	Feb. 23-26
Salon, San Francisco, Calif.	Feb. 27-Mar. 5

CONVENTIONS

National Association of Finance Companies, Chicago	Nov. 17-18
American Society Mechanical Engineers—Annual meeting, New York City	Nov. 30-Dec. 4
American Roadbuilders Association, Detroit, Mich.	Jan. 11-14, 1932
S.A.E. Annual Dinner, New York City,	Jan. 14
S.A.E. Annual Meeting, Detroit, Mich.,	Jan. 25-29

S.A.E. SECTION MEETINGS

Cleveland, Ohio	Nov. 9
Detroit, Mich. (Body Activity)	Nov. 9
St. Louis, Mo.	Nov. 10
Baltimore, Md.	Nov. 12
Philadelphia, Pa.	Nov. 12
Northern California (Stanford University)	Nov. 12
Wichita, Kan.	Nov. 12
Kansas City, Mo.	Nov. 13
Indiana (Indianapolis)	Nov. 17
Metropolitan (New York City)	Nov. 19
Detroit (Student Activity)	Nov. 24

A.C.C. Plans Aero Show

NEW YORK, Nov. 2—Aeronautical Chamber of Commerce, Inc., will hold its 1932 aircraft show in Detroit, April 2 to 10. Ray Cooper, who has directed the shows since 1928, will also direct the coming exhibit. The exhibit will be staged in the exposition hangar at the Detroit City Airport, which affords facilities not yet offered by any other city of equal size.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Nov. 4—Business reports, on the whole, were decidedly more cheerful last week. The better sentiment was based partly on rising security and commodity prices, partly on greater confidence in the banking situation, and partly on scattered reports of actual industrial and trade expansion. There are signs that the hoarding of money, which restricted business and seriously embarrassed some banks, has begun to decrease. The overwhelming victory of the National Government in the British election has also served to strengthen confidence.

CAR LOADINGS

The movement of railway freight traffic continues at a low level. Loading of revenue freight for the week ended Oct. 17 totaled 761,719 cars, showing a decrease of 2145 cars below the total for the preceding week, 169,386 cars below that for the corresponding week last year, and 423,845 cars under that for the same week two years ago.

ELECTRICITY OUTPUT

The production of electricity by the electric light and power industry of the United States for the week ended Oct. 24, according to the National Electric Light Association, was slightly smaller than in the preceding week and 5.8 per cent below that in the corresponding period last year.

LUMBER ORDERS

Lumber orders were 1 per cent above the cut during the week ended Oct. 24, according to telegraphic reports from 816 leading hardwood and softwood mills to the National Lumber Manufacturers Association. Shipments were 7 per cent in excess of output.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended Oct. 24 amounted to 2,381,250 barrels, as compared with 2,437,000 barrels for the preceding week and 2,378,200 barrels for the corresponding period last year.

BITUMINOUS COAL

Production of bituminous coal during the week ended Oct. 17 totaled 8,145,000 net tons, as against 7,848,000 tons in the preceding week and 9,230,000 tons a year earlier. For the calendar year to date, the total is 301,577,000 net tons, as compared with 362,394,000 tons a year ago.

BUSINESS FAILURES

Business failures reported to Bradstreet's last week numbered 533, as against 511 in the preceding week and 430 in the corresponding period last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices stood at 68.5 last week, as against 68.5 a week earlier and 68.2 two weeks earlier.

BANK DEBITS

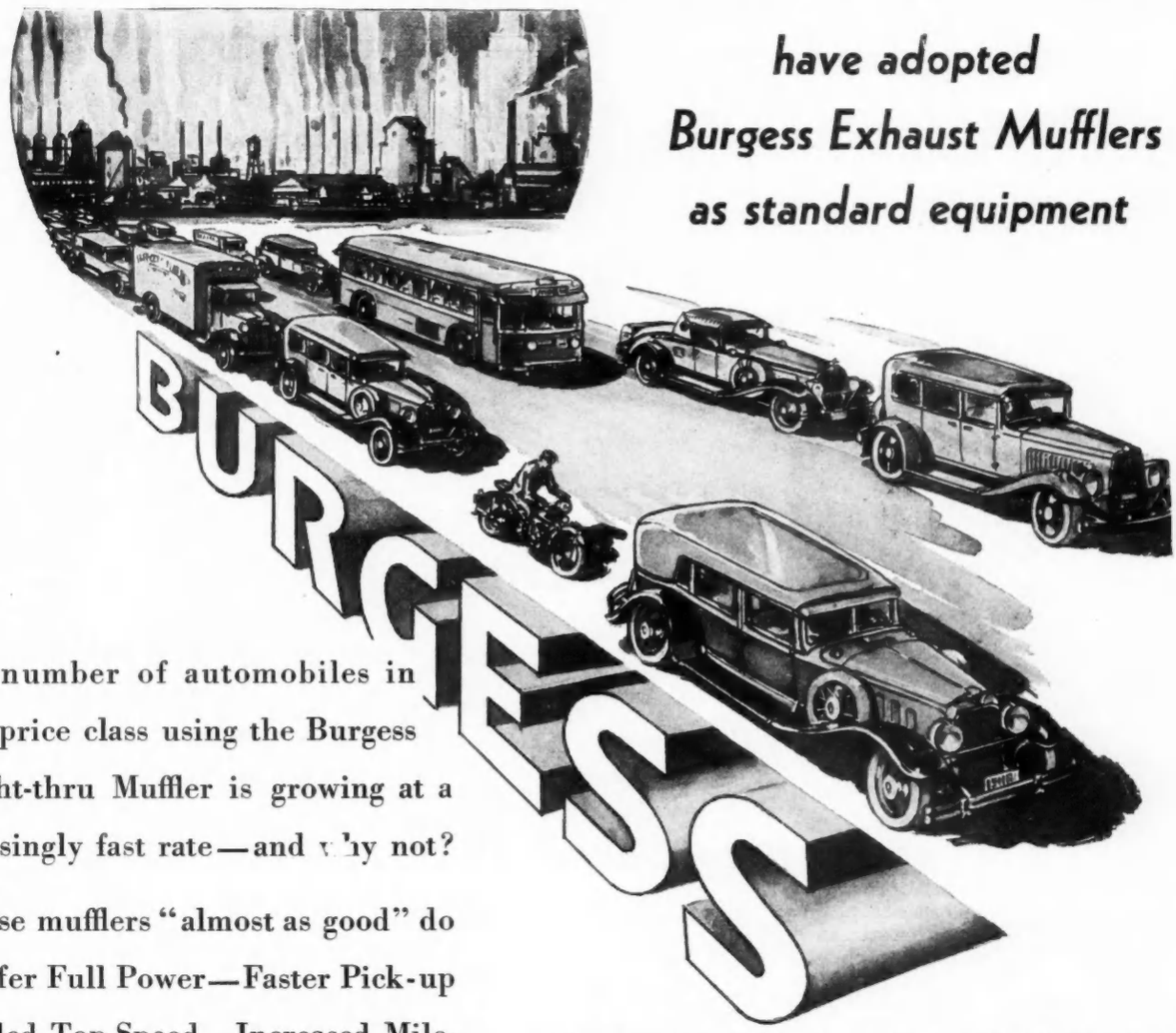
Bank debits to individual accounts outside of New York City during the week ended Oct. 28 were 27 per cent smaller than in the corresponding period last year.

RESERVE STATEMENT

Rediscounted bills held by the Federal Reserve banks increased $19,000,000 during the week ended Oct. 28, while holdings of bills bought in the open market declined $44,000,000, and holdings of Government securities remained practically unchanged. Federal Reserve notes in circulation increased $1,000,000, while deposits decreased $47,000,000, and reserves $24,000,000. The reserve ratio remained unchanged at 59.9 per cent.

More Leading Motor Vehicles

have adopted
Burgess Exhaust Mufflers
as standard equipment

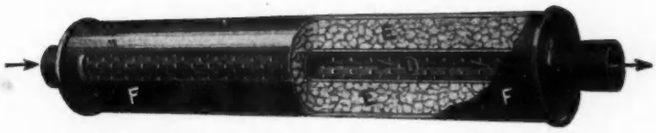


THE number of automobiles in every price class using the Burgess Straight-thru Muffler is growing at a surprisingly fast rate—and why not?

Because mufflers "almost as good" do not offer Full Power—Faster Pick-up—Added Top Speed—Increased Mileage—Reduced Valve Burning and Improved Acoustical Characteristics—all essential requirements obtainable only in the Burgess Straight-thru, Full-Power Exhaust Muffler.

Our engineers will welcome an opportunity to work with you on your muffler problems.

"STRAIGHT-THRU" MUFFLER



As illustrated above, the Burgess Muffler consists of three principal parts; a straight open perforated pipe, D, surrounded by a sound absorbing material, E, which is enclosed in a metal covering, F. The exhaust gases from the engine pass straight through the perforated pipe, D, but the exhaust noises are absorbed, assuring satisfactory muffling.

BURGESS BATTERY COMPANY
111 WEST MONROE STREET, CHICAGO

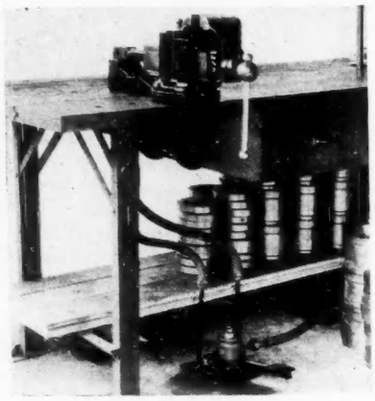
ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Attachment for Operating Bench Vise

An air-cylinder attachment for operating a bench vise has been placed on the market by the Tomkins-Johnson Co., Jackson, Mich. A feature of this attachment is the simplicity of its installation. No change is necessary on the vise except the removal of the

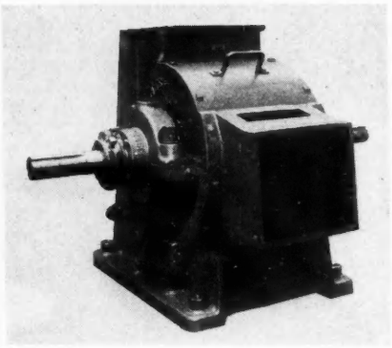


nut. The vise is mounted on a steel casting which is secured through the bench to a plate underneath holding the cylinder. The attachment can be adapted to any standard bench vise, retaining the original stroke and fine screw adjustment on the vise. One movement is required to operate the opening stroke. The foot valve, by means of a spring, returns the cylinder, clamping the vise. This vise can be equipped with a foot valve to hold the vise in either position.

M & M Type A Red Band Hog

Many automotive plants will be interested in the new Type A Hog recently placed on the market by Mitts & Merrill, Saginaw, Mich. This machine is designed to reduce fibrous materials such as wood, paper, rags, cork, etc. The new model fills the need for a small, general purpose unit of low initial cost.

By means of steel plate screens at the discharge with holes of varying diameter from ⅛ in. up to 2 in. or 3 in. the fineness of the reduced product is controlled. In reducing miscellaneous wood refuse such as blocks, board ends, edgings, etc., in the average woodworking factory, by means of ⅛ in. or ¼ in. diameter hole screens, the wood waste in one operation is reduced to a fine synthetic sawdust. All types of fibrous materials can be similarly reduced.



The machine is arranged for either belt or direct connected motor drive, has cast steel cylinder, and is equipped with Timken rollers bearings.

Cleveland Multiple Spindle Machines

The Cleveland Automatic Machine Co., Cleveland, Ohio, has recently brought out an improved line of multiple-spindle machines. Some of the major improvements are given here.

The bed frame is of arch type construction supported at both ends to offer maximum rigidity and eliminate vibration. This construction leaves an unobstructed opening through the center of the bed through which the chips fall to the pan below and more than doubles the former chip capacity.

A large opening in the bed under the spindle head permits easy removal of chips, either by mechanical or manual means, or if more convenient they can be removed from the back of the machine where the pan is flared out for this purpose.

The cutting lubricant passes through a strainer at the feed end of the machine to the first reservoir in the pan where any foreign substance settles, while the clear lubricant passes over a baffle wall to the second reservoir, from where it is pumped to the cutting tools.

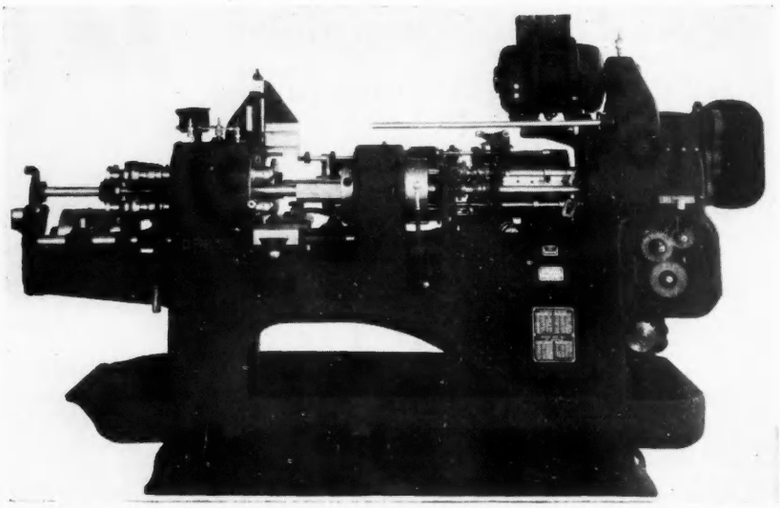
Power for driving the machine is transmitted through a friction clutch mounted in the drive head bracket provided with a lever to stop and start the machine.

The die spindle is revolving and provided with two gear ratios to vary the cutting speed for different materials. It is self-contained and is arranged with a positive trip off at the end of the tapping stroke, making it possible to hold very close dimensions between the end of the tap and shoulder of the work being tapped. Extra spindles can be installed in the tool turret and operated from the same bracket by the addition of extra levers and spindles.

The gage stop is mounted in the bed between the spindle and tool turret housing and swings into gaging position during the indexing of the spindle turret, permitting free use of the lower rear or fourth position for cutting tools.

The double top slide mounted over the work spindle turret provides two extra tool positions for the two upper spindles. All slides are independently controlled and provided with adjustments for accurately sizing the work.

(Turn to page 746, please)



The buyer who keeps coming back . . but NOT to buy!

You know him. The fellow who's tickled to death with his new car—for the first few days.

Then he comes back complaining about a body squeak. You put a mechanic on the job. A squirt of oil—the turn of a wrench—and the squeak is gone.

But not for long. The customer keeps coming back. At every trip, his irritation mounts—and so does your free service cost. Gone is all his bubbling enthusiasm for that shiny new car—and gone, very often, is a future sale for you.

• • • • •

When an automobile body has no joints, there can be no squeaks—no rattles. Budd has eliminated joints by eliminating parts and by the extensive use of flash-welding. The Budd All-Steel one-piece body is made of only eight major parts — flash-welded into one single, jointless unit.

Originated by Budd engineers, this type of construction insures a degree of silence impossible in any other type of body.

Many dealers find that the Budd one-piece body eliminates free service cost on "squeaks and squawks". And, over and above this saving, its quietness is a help in selling cars—and in keeping them sold.

★BODIES BY BUDD★

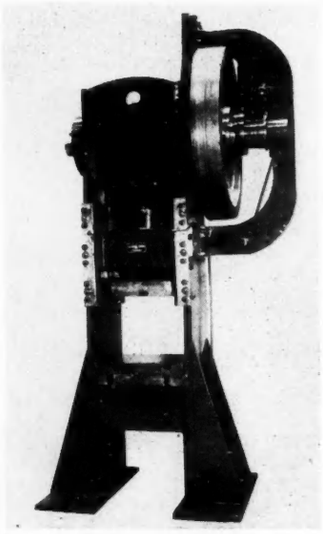
Originators of the All-Steel Body. Supplied to Manufacturers in the United States, Great Britain, France and Germany

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Verson Allsteel Trimming Press

The illustration shows the new Verson allsteel trimming press recently added to the line of the Allsteel Press Co., Chicago, Ill. It is of welded steel plate construction and built in all capacities. It may be built to meet the user's exact needs with little or no change in cost. It is said to be rigid, compact



and unbreakable to an extreme degree. The steel plate provides unusual rigidity, while the specially constructed long ram and gibways are said to assure precise action and long die life.

The presses are quick acting and are provided with an automatic stop at top of stroke. The eccentric shafts are accurately turned and ground from alloy steel forgings. Main bearings are bronze-bushed, and the steel gibs are bronze-faced and are adjustable for wear. All working parts are lubricated by a centralized one-shot fluid grease system.

Airco Welding Torch

The Air Reduction Sales Co., New York, N. Y., has recently placed on the market the new Style 9800 welding torch. It is designed for the medium and heavy classes of oxy-acetylene welding.

Important new features of this torch are as follows: Ribbed handle, new type mixing-head nut, oxygen and acetylene ball-seat type needle valves, needle valves easily repacked, and an unusually soft flame characteristic.

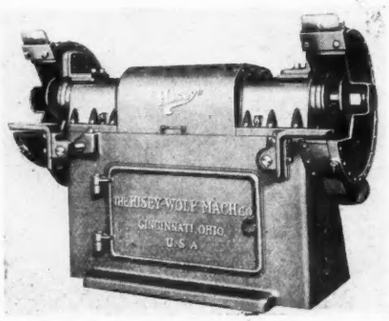
The use of a wrench to properly position the tip each time one is changed has been eliminated through the design of the new mixing head nut. A skirt has been added to the hexagonal nut, allowing it to be loosened or tightened by hand. If for any reason the mixing head nut cannot be loosened by hand, a wrench can be applied to the hexagonal nut.

The soft flame characteristic is achieved by reversing the conventional method of bringing the gases to the tip. In this torch the oxygen enters the torch head at the side and the acetylene through the center. The mixing device operates on the well-known principle employed in Airco-Davis-Bournonville torches, and assures intimate mixing of the oxygen and acetylene before entering the tip.

Hisey Heavy Duty Snagging Grinder

An improved snagging grinder with independent speed control for each wheel has been placed on the market by the Hisey-Wolf Machine Co., Cincinnati, Ohio. It is made for 20, 24 and 30-in. grinding wheels, either high speed or vitrified, with spindle speeds to correspond. Ball bearings or Timken roller bearings are optional.

On previous machines with wheels on both ends of spindle the speed of both, for safety reasons, was determined by the size of the larger wheel, thereby causing the smaller to run too slow. This is especially marked when one wheel is replaced by a new one of full size and the other still has a few inches of wear. On this machine, however, the operation of each wheel is entirely independent.



The drive is through V-belts and any stock power motor can be used. Another feature is automatic belt tension adjustment, which eliminates motor adjustment. Steel plate riveted guards with exhaust connection and bayonet-type doors are standard equipment. A steel spark arrester is firmly held in box type of slide and easily adjusted to the wear of the wheel.

H-P-M Oil Pressure Assembling Presses

The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, has placed on the market a series of hydraulic presses to be known as the H-P-M oil pressure-assembling presses for quantity production in general shop pressing operations.

The H-P-M assembling press is the open-gap type, which provides easy access to the work from both sides as well as the front. The press frame is of a heavy one-piece casting with deep backbone section, with no appreciable spring-back under load.

The operating system consists of a rotary-type, low-pressure oil pump which advances the ram to the work more rapidly, and a radial-type, high-pressure oil pump for generating the full working pressure to drive the press ram. Both are driven from one electric motor.

There are two forward speeds—a rapid closing speed and a slower full-load pressing speed that is automatically controlled through a single manually operated lever that controls speed of ram movement in either forward or reverse. Overtravel is impossible as pump discharge is automatically diverted when extreme ram travel is reached. Due to the single control, the operator can halt ram movement anywhere between its neutral position and the extreme travel. It is only necessary for the operator to release his hold on the lever to allow the ram to return to its neutral position, where it automatically stops, the pump maintaining merely sufficient pressure to support the weight of the press ram.

The working pressure may be regulated by a simple adjustable control.

These presses are recommended by the maker for production speed in assembling, straightening, broaching, or any operation where rapid performance is required to facilitate ease in handling force fits and other assembling and disassembling operations in maintenance.

Available in seven capacities, from 15 to 200 tons, with either square or extended beds.